TASCAM professional

DR4
HARD DISK RECORDER

WARNING

To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

Operator's Manual

AKAI DR4

Hard Disk Recorder

Owner's Manual

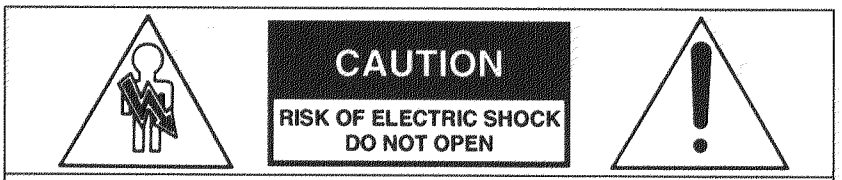
(Software Version 1.0)

To show our support for the protection of the earth's environment, this manual has been printed entirely on recycled paper.

WARNING!!

To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

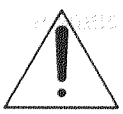
1-En



CAUTION : TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

THE SYMBOLS ARE RULED BY UL STANDARDS (U.S.A)

The lightning flash with the arrowhead symbol superimposed across a graphical representation of a person, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock.



The exclamation point within an equilateral triangle is intented to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

5A-En

WARNING

Power requirements for electrical equipment vary from area to area. Please ensure that your DR4 meets the power requirements in your area. If in doubt, consult a qualified electrician or Akai Professional dealer.

120VAC	@ 60Hz for USA and Canada
220-230VAC	@ 50Hz for Europe (excluding UK)
240VAC	@ 50Hz for UK and Australia

PROTECTING YOURSELF AND THE DR4

* Never touch the AC plug with wet hands.
* Always disconnect the DR4 from the power supply by pulling on the plug, not the cord.
* Allow only an Akai Professional dealer or qualified professional engineer to repair or reassemble the DR4. Apart from voiding the warranty, unauthorized engineers might touch live internal parts and receive a serious electric shock.
* Do not put, or allow anyone to put any object, especially metal objects, into the DR4.
* Use only a household AC power supply. Never use a DC power supply.
* If water or any other liquid is spilled into or onto the DR4, disconnect the power, and call your dealer.
* Make sure that the unit is well-ventilated, and away from direct sunlight.
* To avoid damage to internal circuitry, as well as the external finish, keep the DR4 away from sources of direct heat (stoves, radiators, etc.).
* Avoid using aerosol insecticides, etc. near the DR4. They may damage the surface, and may ignite.
* Do not use denaturated alcohol, thinner or similar chemicals to clean the DR4. They will damage the finish.
* Modification of this equipment is dangerous, and can result in the functions of the DR4 being impaired. Never attempt to modify the equipment in any way.
* In order to assure optimum performance of your DR4, select the setup location carefully, and make sure the equipment is used properly. Avoid setting up the DR4 in the following locations:
    1. In a humid or dusty environment
    2. In a room with poor ventilation
    3. On a surface which is not horizontal
    4. Inside a vehicle such as a car, where it will be subject to vibration
    5. In an extremely hot or cold environment

Precautions When Using the Optional Internal HD240 Hard Disk Drive

1. The hard disk drive has extremely high precision and is vulnerable to shock and vibration. If transporting the DR4 by either land or air, we recommend packing it in a shell-shaped case lined with urethane rubber which meets ATA specifications.

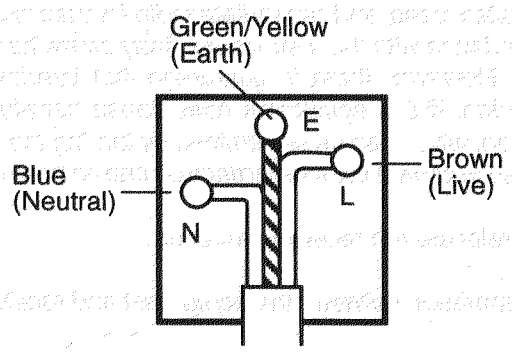
2. Make sure the DR4 is used in the horizontal position. Do not set it on end or tilt it when using it.

3. If the DR4 is moved from a cold location to a warm one, or if the temperature has been raised suddenly, condensation may form inside the DR4. If it is impossible to avoid conditions like these, let the DR4 sit for at least an hour in the new location before using it.

4. When setting up the DR4, make sure the ventilation opening is not blocked. Also, if using the DR4 in a rack that contains other equipment, make sure sufficient ventilation space is assured on all sides (approx. 44 mm of space between the DR4 and any equipment mounted above or below it in the rack).

FOR CUSTOMERS IN THE UK

IMPORTANT FOR YOUR SAFETY
The flex supplied with your machine will have three wires, as shown in the illustration.



*****WARNING: THIS APPLIANCE MUST BE EARTHED*****

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

Green - and - yellow : Earth

Blue : Neutral

Brown : Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows: The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked by the letter E or by the safely earth symbol ⏚ or coloured green or coloured green- and-yellow.
The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

6B-En

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorientate or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help. 21B-En

AVIS POUR LES ACHETEURS CANADIENS DU DR4

Le présent appareil numérique n'ément pas des bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada 27-F

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. 27-En

FÜR KUNDEN IN DER BUNDESREPUBLIK DEUTSCHLAND

Bescheinigung von AKAI

Hiermit wird bescheinigt, daß das Gerät AKAI
DR4
in Übereinstimmung mit den Bestimmungen der
Amtsblattverfügung 1046/1984
funkentstört ist.

Der Deutschen Bundespostwurde das Inverkehrbringen dieses Gerätes angezeigt und die Berichtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.
AKAI ELECTRIC CO., LTD 17B-G

COPYRIGHT NOTICE

The AKAI DR4 is a computer-based device, and as such contains and uses software in ROMs. This software, and all related documentation, including this Owner's Manual, contain proprietary information which is protected by copyright laws. All rights are reserved. No part of the software or its documentation may be copied, transferred or modified. You may not modify, adapt, translate, lease, distribute, resell for profit or create derivative works based on the software and its related documentation or any part there of without prior written consent from AKAI Electric Co. Ltd, Tokyo, Japan.

WARRANTY

AKAI Electric Co. Ltd warrants its products, when purchased from an authorized AKAI dealer, to be free from defects in materials and workmanship for a period of 12 (twelve) months from the date of purchase. Warranty service is effective and available to the original purchaser only, and only on completion and return of the AKAI Warranty Registration Card within 14 days of purchase.

Warranty coverage is valid for factory-authorized updates to AKAI instruments and their software, when their installation is performed by an authorized AKAI Service Centre, and a properly completed Warranty Registration has been returned to your Akai Professional dealer.

To obtain service under this warranty, the product must, on discovery of the defect, be properly packed and shipped to the nearest AKAI Service Centre. The party requesting warranty service must provide proof of original ownership and date of purchase of the product.

If the warranty is valid, AKAI will, without charge for parts or labour, either repair or replace the defective part(s). Without a valid warranty, the entire cost of the repair (parts and labour) is the responsibility of the product's owner.

AKAI warrants that it will make all necessary adjustments, repairs and replacements at no cost to the original owner within 12 (twelve) months of the purchase date if:

1 The product fails to perform its specified functions due to failure of one or more of its components.

2 The product fails to perform its specified functions due to defects in workmanship.

3 The product has been maintained and operated by the owner in strict accordance with the written instructions for proper maintenance and use as specified in this Operator's Manual.

Before purchase and use, owners should determine the suitability of the product for their intended use, and the owner assumes all risk and liability whatsoever in connection therewith. AKAI shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use, or inability to use the product.

The warranty provides only those benefits specified, and does not cover defects or repairs needed as a result of acts beyond the control of AKAI, including, but not limited to:

1 Damage caused by abuse, accident or negligence. AKAI will not cover under warranty any original factory disk damaged or destroyed as a result of the owner's mishandling.

2 Damage caused by any tampering, alteration or modification of the product: operating software, mechanical or electronic components.

3 Damage caused by failure to maintain and operate the product in strict accordance with the written instructions for proper maintenance and use as specified in this Operator's Manual.

4 Damage caused by repairs or attempted repairs by unauthorized persons.

5 Damage caused by fire, smoke, falling objects, water or other liquids, or natural events such as rain, floods, earthquakes, lightning, tornadoes, storms, etc.

6 Damage caused by operation on improper voltages.

IMPORTANT NOTE: This warranty becomes void if the product or its software is electronically modified, altered or tampered with in any way.

AKAI shall not be liable for costs involved in packing or preparing the product for shipping, with regard to time, labour or materials, shipping or freight costs, or time and expenses involved in transporting the product to and from an AKAI Authorized Service Centre or Authorized Dealer.

AKAI will not cover under warranty an apparent malfunction that is determined to be user error, or the owner's inability to use the product.

THE DURATION OF ANY OTHER WARRANTIES, WHETHER IMPLIED OR EXPRESS, INCLUDING BUT NOT LIMITED TO THE IMPLIED CONDITION OF MERCHANTABILITY, IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY HEREIN.

AKAI hereby excludes incidental or consequential damages, including but not limited to:

1 Loss of time

2 Inconvenience

3 Delay in performance of the Warranty

4 The loss of use of the product

5 Commercial loss

6 Breach of any express or implied warranty, including the Implied Warranty of Merchantability, applicable to this product

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Introduction

From all at Akai, thank you for purchasing an Akai DR4 Hard Disk Recorder, and welcome to the exciting world of hard disk recording. Reading through this manual will provide you with a good understanding of what the DR4 is all about.

What is the DR4?

If you think of a conventional four-track recorder, replace all the analog circuitry with the latest digital audio processing technology, replace the tape transport with a hard disk for near-instant digital audio data access, you won't be far off the DR4 concept. The following feature list will fill you in on the rest.

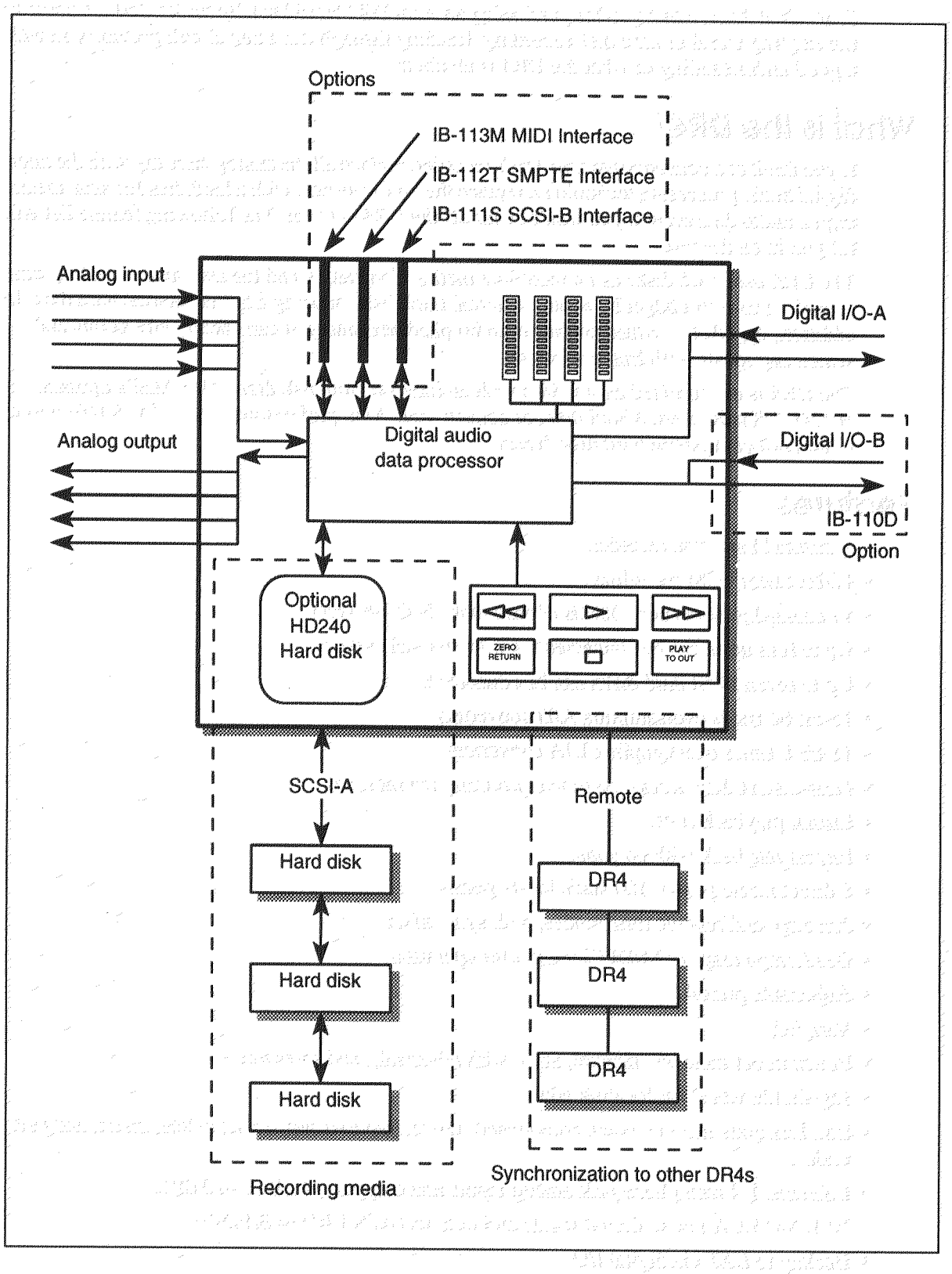
The DR4 uses hard disks as its recording media. You can extend the available recording time according to your budget by adding external hard disks or using a larger internal hard disk. In addition, the DR4 provides nonlinear audio playback, and you can specify edit points and search and locate with frame accuracy.

The DR4 is not supplied as standard with an internal hard disk drive. Use Akai's optional HD240 240MB internal hard disk, or consult your Akai professional dealer for details about other DR4 compatible hard disk drives.

Features

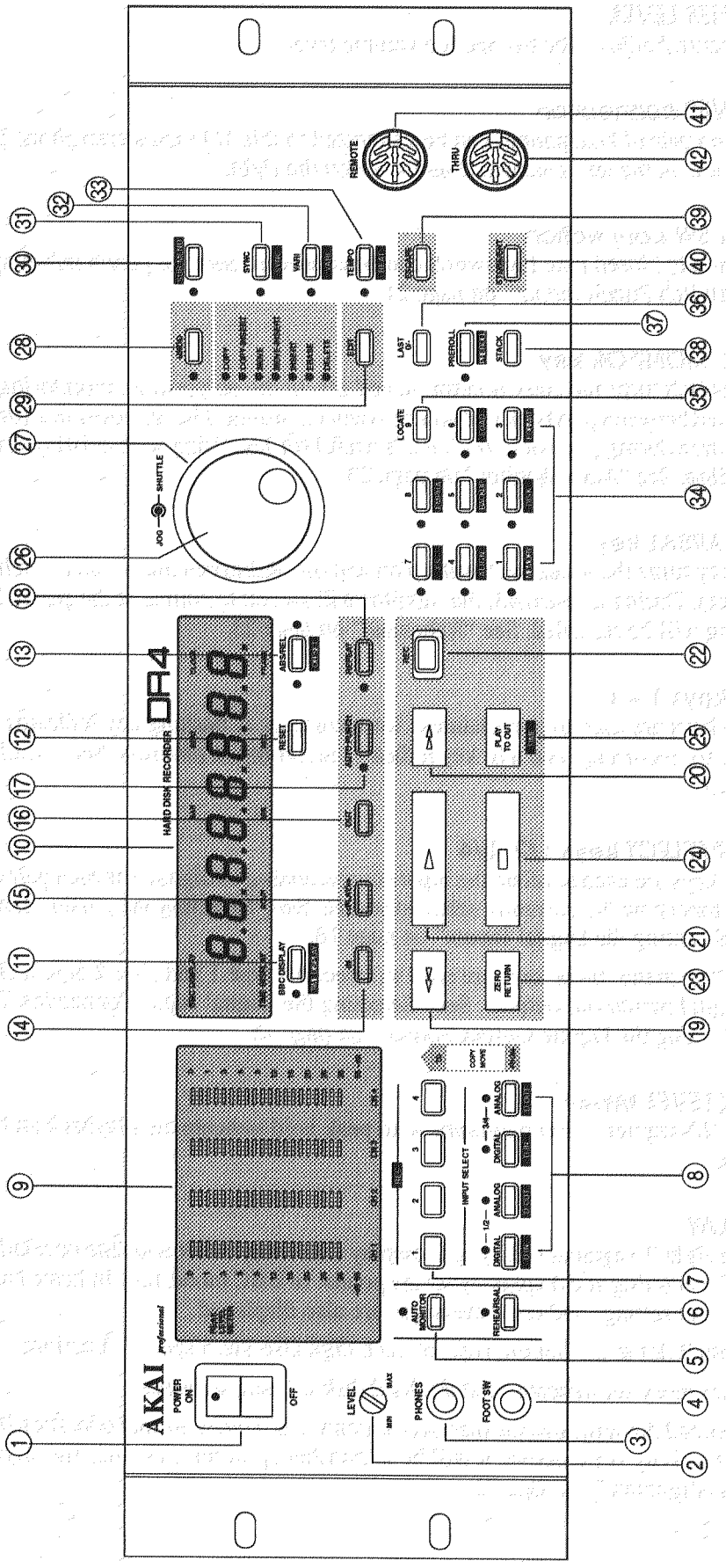
- 4-channel hard disk recorder.
- 16-bit linear PCM recording.
- 17 channel minutes per 100MB of hard disk (fs @ 48 kHz).
- Up to four units can be connected for a 16 channel system.
- Up to seven SCSI hard disks can be connected.
- 16-bit 64-times oversampling A/D converters.
- 18-bit 8-times oversampling D/A converters.
- Near-instant data access, no time consuming rewinds, etc.
- Instant playback start.
- Repeat playback with no gaps.
- 8 direct locate points. 100 stack locate points.
- Absolute and relative time modes, with sync offset.
- Beat/tempo map for MIDI Clock master operation.
- Adjustable preroll.
- Varipitch.
- Punch in/out includes: manual, auto (with rehearsal), and footswitch.
- Jog/shuttle wheel for locating edits.
- Edit functions include: copy, copy+insert, move, move+insert, erase, delete, insert, and edit undo.
- Balanced 1/4 inch phone jack analog inputs and outputs (+4 dB or –10 dB).
- XLR and RCA/phono digital inputs and outputs (AES/EBU or S/PDIF).
- Backup to DAT via digital I/O
- Optional IB-113M MIDI Interface for MIDI sequencer synchronization.
- Optional IB-11OD Digital Interface allows four channel playback & recording via digital I/O.
- Optional HD240 240MB hard disk can be installed.

Inside the DR4



1 Front & Rear Panels

Front Panel



1) POWER switch
This is the power switch. The rocker part of this switch is recessed in the ON position to prevent accidental power off.

2) PHONES LEVEL
This control adjusts the headphone volume level.

3) PHONES connection
A stereo pair of headphones can be connected to this 1/4 inch stereo phone jack. Channels 1 and 3 are on the left, channels 2 and 4 are on the right.

4) FOOT SW connection
A normally closed type footswitch can be connected here for punch in/out operation. See "Footswitch Punch In/Out" on page 21.

5) AUTO MONITOR key
This switch turns the auto monitor on and off. In the on position, monitoring is automatically switched between playback and source when recording. The off position allows you to monitor the source during playback too. This is useful for practising with existing tracks before recording. See "Auto Monitor" on page 23.

6) REHEARSAL key
This key turns the rehearsal function on and off. Rehearsal allows you to rehearse punch ins and outs. During a rehearsal, the monitor will switch to source at the punch in point, but nothing will be recorded. See "Rehearsal" on page 23.

7) REC keys 1 ~ 4
These keys are used to arm channels for recording. A flashing key indicates that a channel is armed for recording, and a lit key indicates recording in progress. See "Arming Channels" on page 19.

8) INPUT SELECT keys 1/2, 3/4
These keys are used to select the input source, analog or digital, for each pair of channels. LED indicators show the currently selected source. See "Selecting the Analog Inputs" on page 16 and "Selecting the Digital Inputs" on page 18.

In the sub menu, these keys are used to select the type 1 and type 2 digital signal formats for the digital inputs and outputs. See "Selecting the Digital Input Connection Type" on page 17 and "Setting the Digital Output Format" on page 18.

9) PEAK LEVEL METER
These 20-segment LED bargraphs with peak hold indicate the playback and source signal levels.

10) DISPLAY
These eight 7-segment LED digits display disk time, either absolute or relative. They are also used for entering and displaying locate points. In BBC mode, they indicate bar, beat, and clock. Sub menu settings and error messages are also displayed.

The small dot at the bottom right of each digit also has a special function:

The left most dot indicates that the hard disk is being accessed.

The second dot indicates the disk access condition. Under normal operation it will flash. If data access activity is excessive, it will be lit constantly. In this case, use the align function. See "Data Alignment" on page 52.

The four dots from the right, 1, 2, 3, 4 from left to right, indicate that data exists on a channel at the current position. If this dot is lit but nothing is output during playback, this indicates a recorded blank area. Although blank areas do not contain any data, they do use hard disk space, so it's best to erase them in order to free up the space.

11) BBC DISPLAY key

This key switches the display to BBC mode: Bar, Beat, and Clock. This mode is mainly used when the DR4 is working as a MIDI Clock master with the optional IB-113M MIDI Interface. See "MIDI Synchronization" on page 56.

12) RESET key

This key is used to reset the relative time to zero. If it is pressed while an absolute time is displayed, relative time will be selected automatically, just like pressing the ABS/REL key.

13) ABS/REL key

This key switches the display between absolute time and relative time. Absolute time starts at zero, cannot be changed, and works as the base time for relative time. When synchronizing via SMPTE or MIDI, the relative mode can be used to set synchronization offsets.

14) IN key

This key is used to set and locate the in point. The in point is the point at which repeat playback starts and auto punch in occurs. It is also used to specify the beginning of a section when editing.

15) <<PLAY>> key

This key is used to play back the section between the in point and out point.

16) OUT key

This key is used to set and locate the out point. The out point is the point at which repeat playback ends and auto punch out occurs. It is also used to set the end of a section when editing.

17) AUTO PUNCH key

This key switches the DR4 to auto punch in/out mode. In this mode, punch in will occur automatically when the in point is reached. Likewise, punch out will occur automatically when the out point is reached.

18) REPEAT key

This key is used to switch on repeat mode. In this mode, playback will be repeated between the in point and out point. This is similar to the repeat function found on many tape based recorders. However, with the DR4 there is no rewind time between out point and in point – repeated playback cycles round like a continuous loop.

19) Rewind key

This key is like the rewind key found on most conventional tape recorders. In stop mode, it activates time display fast rewind. In play mode, it activates playback review.

20) Fast Forward key

This key is like the fast forward key found on most conventional tape recorders. In stop mode, it activates time display fast forward. In play mode, it activates playback preview.

21) Play key

This key is used to start playback. Pressing this key while holding down the REC key will start recording.

22) REC key
This key (in combination with the play key) is used to start recording. It lights up while recording is in progress.

23) ZERO RETURN key
In absolute mode, this key will locate to the absolute 00:00:00:00 point. In relative mode, it will locate to the relative 00:00:00:00 point.

24) Stop key
This key is used to stop playback, recording, fast forward, and rewind.

25) PLAY TO OUT key
This key will start playback at a specified number of seconds before the current position, i.e., the currently displayed time. Playback will stop when that current position is reached. This is useful for confirming edit points. The number of seconds can be specified in the TIME sub menu.

26) JOG wheel
The jog wheel allows you to locate while listening to a recording. Playback speed is determined by how fast you turn the wheel. Turn it counterclockwise to review and clockwise to preview.

This wheel is also used to set parameter values. Turn it counterclockwise to decrease values and clockwise to increase them.

27) SHUTTLE control
Like the JOG wheel, the shuttle control also allows you to locate while listening to a recording. The playback speed can be 1/4, 1/2, x2, x4 normal speed, and is determined by the angle at which you hold the control. Turn it counterclockwise to review and clockwise to preview.

This control is also used to set parameter values in single steps. Turn it counterclockwise to decrement a value one step, and clockwise to increment one step.

28) UNDO key
This key allows you to undo the last recording or edit. This is useful if you make a mistake while recording and want to return to the previous recording. Likewise, when editing you can compare the material before and after an edit. See "Recording Undo" on page 24 and "Undoing an Edit" on page 35.

29) EDIT key
This key is used to select the edit functions. See "Editing" on page 35.

30) SUB MENU key
This key is used to select sub menu functions. To select a sub menu function, press this key, then press the corresponding sub menu key. The names of sub menu functions appear underneath certain keys in grey boxes.

31) SYNC key
This key is used to activate synchronization with an external device. Up to four DR4s can be synchronized using Akai AL-X50 Remote Cables. An optional IB-113M MIDI Interface or IB-112T SMPTE reader is required for MIDI and SMPTE synchronized operation.

32) VARI key
This key switches on the varipitch function for playback. The amount of varipitch is set using the VARI sub menu function. See "Varipitch" on page 28.

33) TEMPO key

This key is used when creating a tempo map. Tempo maps are used when the DR4 is used as a MIDI Clock master with the optional IB-113M MIDI Interface. See "MIDI Synchronization" on page 56.

In the sub-menu, it is used for creating a beat map. See "Creating a Beat Map" on page 59.

34) Keypad 1 ~ 8

These keys are used to store and recall the eight direct locate points, enter time values, and set parameter values.

35) LOCATE 9 key

This key is used to enter locate time values. See "Locating to a Specific Point" on page 29. It is also used for entering time values and setting parameter values.

36) LAST 0/-

This key is used to locate to the last two points at which the stop key was pressed. Press the key once to locate to the last point at which the stop key was pressed. Press again to locate to the last but one point. See "Last Memory" on page 32.

This key is also used for entering time and parameter values, and entering negative values.

37) PREROLL key

This key is used to switch on the preroll function. Preroll refers to a specified number of seconds before the specified locate point. For example, if the preroll value is set to 5, the DR4 will locate to a point 5 seconds before the specified locate time. The preroll value is set using the PREROLL sub menu function. See "Preroll" on page 32.

38) STACK key

This key is used to enter and recall the 100 stack locate points. See "Stack Locate Points" on page 31.

39) ESCAPE key

This key can be used to escape from the current edit or sub menu function. It can also be used to escape from incorrectly entered time values

40) STORE/ENT key

This key is used when entering and storing time values, executing edit functions, etc.

41) REMOTE connection

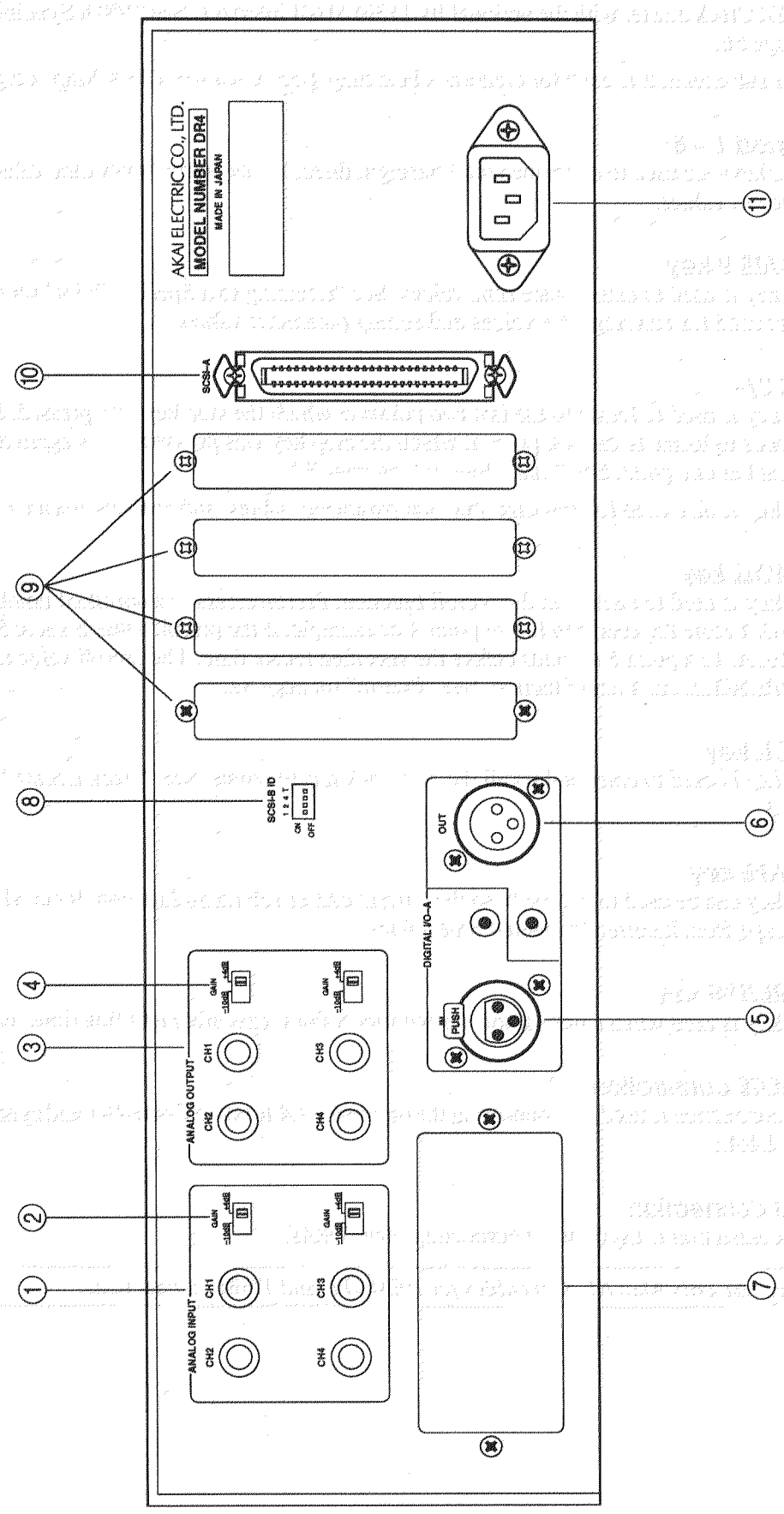
This connection is used for connecting the optional DL4 Remote Controller and synchronizing other DR4s.

42) THRU connection

This connection is used for synchronizing other DR4s.

Note: Use only Akai AL-X50 cables for REMOTE and THRU connections.

Rear Panel


AKAI ELECTRIC CO., LTD.
MODEL NUMBER DR4
MADE IN JAPAN
SCSI-A
SCSI-B ID
1 2 4 T
ON
OFF
OUT
DIGITAL I/O-A
IN
PUSH
GAIN
-10dB
+4dB
ANALOG OUTPUT
CH1
CH2
CH3
CH4
ANALOG INPUT
1
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7
8
9
10
11

1) ANALOG INPUT

These 1/4 inch stereo phone jacks are used to input analog signals to the DR4. They accept balanced and unbalanced signals: Tip = hot, ring = cold, sleeve = ground.

2) Input GAIN switch

These switches allow you to set the DR4 input gain. They can be set to –10 dB or +4 dB. Input gain switches are provided for channels 1/2 and channels 3/4.

3) ANALOG OUTPUT

These 1/4 inch stereo phone jacks are used to output analog signals from the DR4. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground.

4) Output GAIN switch

These switches allow you to set the DR4 output gain. They can be set to –10 dB or +4 dB. Output gain switches are provided for channels 1/2 and channels 3/4.

The actual output gain depends whether you use the outputs balanced or unbalanced. The following table shows the actual gain for each possible setting:

Connection Type	Switch Setting	
	–10 dB	+4 dB
Balanced	–4 dB	+4 dB
Unbalanced	–10 dB	–2 dB

0 dB = 0.775 V

5) DIGITAL I/O–A IN

These XLR and RCA/phono connectors are used to input AES/EBU and S/PDIF format digital signals respectively. The active input is selected using the D IN sub menu function. See "Selecting the Digital Input Connection Type" on page 17.

Without the optional IB-11OD Digital Interface, the left channel digital signal is fed to channels 1 and 3. Similarly, the right channel digital signal is fed to channels 2 and 4. For this reason, it is not possible to record more than two channels simultaneously via the digital inputs. If you do need to record three or four channels simultaneously via the digital inputs, use the optional interface.

6) DIGITAL I/O–A OUT

These XLR and RCA/phono connectors are used to output AES/EBU and S/PDIF format digital signals. The format of the digital output signal is set using the D OUT sub menu function. See "Selecting the Digital Input Connection Type" on page 17.

Without the optional IB-11OD Digital Interface, only channel signals 1 and 2 can be output digitally. If you need to output three or four channels simultaneously via the digital outputs, use the optional interface.

You can backup all four channels to a DAT recorder via digital outputs 1 and 2 even without the optional IB-11OD Digital Interface.

7) DIGITAL I/O–B option slot

An optional IB-11OD Digital Interface can be installed into this slot. This interface allows digital signals for channels 3 and 4 to be input and output independently of the DIGITAL I/O–A connections.

8) SCSI-B ID

This DIP switch is for use with the optional IB-IIIS SCSI interface. It is used to set the DR4's SCSI ID and termination for SCSI-B bus. This bus is for backing up to an MO disk and connecting to personal computers.

This switch has no effect on SCSI-A bus.

9) Option slots

These option slots are for installing the following interface cards: IB-112T SMPTE Reader, IB-113M MIDI Interface, and IB-IIIS SCSI-B Interface.

10) SCSI-A connection

For increased recording time, up to six external SCSI hard disks can be connected to this connection (up to seven with no internal hard disk). See "Hard Disks" on page 45.

11) Power inlet

Connect the supplied power cable to this connection. Connect the other end of the power cable to an appropriate AC receptacle.

2 Getting Around the DR4

The DR4 is relatively easy to operate, and anyone that has used a conventional tape recorder will find it quite straightforward.

Sub Menus

Many of the DR4 keys provide two functions. A main function and a *sub-menu* function. The main function of such a key is printed above it, and the sub-menu function is printed below it, enclosed in a light gray box. Some sub-menu keys provide access to functions, some to variable parameters.

To access a sub-menu function, first press the SUB-MENU key, then while its indicator is flashing, press the respective key.

Setting Parameters

Most parameters can be set using the jog wheel, shuttle control, or number keypad. However, it does vary from function to function. So refer to the operating procedure for each function.

Entering Time Values

To locate to any point, set the in point, out point, direct locate point, stack locate point, etc., you must display the desired time on the display. The desired time can be entered as follows:

1) **Press the LOCATE key.**
-------- will appear on the display.

2) **Use the number keypad to enter the desired time.**
Time values should be entered from left to right. For example, to enter the time 15 minutes 32 seconds 20 frames, press these number keys in the following order: 1, 5, 3, 2, 2, 0.

If you make a mistake while entering the time, press the RESET key, then reenter the time.

3) **Press the STORE/ENT key.**
The DR4 will display the specified time. Note that the DR4 will actually locate to the specified time. If you want to return to the previous point, press the LAST key.

Of course, you can also use the rewind, fast forward, play, and stop keys, or jog wheel and shuttle control to display a time on the display.

Specifying the In Point & Out Point

The in point and out point values are used for auto punch in/out recording and editing. To set an in point or out point:

1) **Display the desired time on the display.**

2) **Press the STORE/ENT key.**
The display and indicators for number keys 1 to 8 will flash.

3) **Press the IN key or OUT key as required.**
The point will be stored.

In Point & Out Point Notes

The smallest interval allowed between the in point and the out point is 1024 samples. The following list shows how that translates approximately into time for each sampling frequency:

Fs @ 48 kHz = 21 msec

Fs @ 44.1 kHz = 23 msec

Fs @ 32 kHz = 32 msec

Escape

If, while setting a parameter or using a function, you want to cancel it, press the ESCAPE key to return to the previous state.

3 Setting Up the DR4

Siting the DR4

The DR4 should be sited on a strong, level surface, with plenty of room for ventilation. If you rack mount the DR4, leave at least 1U of free space above and below it. Hard disk drives do not like being used at non right angles, so keep the DR4 level.

Connecting The Power

> ***Warning:*** *Before connecting to an AC receptacle, make sure that the mains voltage in your area matches that printed on the DR4 rear panel.*

Connect the supplied power cable to the power inlet on the rear panel of the DR4. Connect the other end of the power cable to an appropriate AC receptacle.

Power On/Off

To power on the DR4, push the POWER switch to its ON position. The DR4 takes about 10 seconds to warm up before it can be used. During this time it checks the status of any disk drives, and its version number is shown on the display. Once the DR4 is ready for use, the time value 00:00:00:00 will appear.

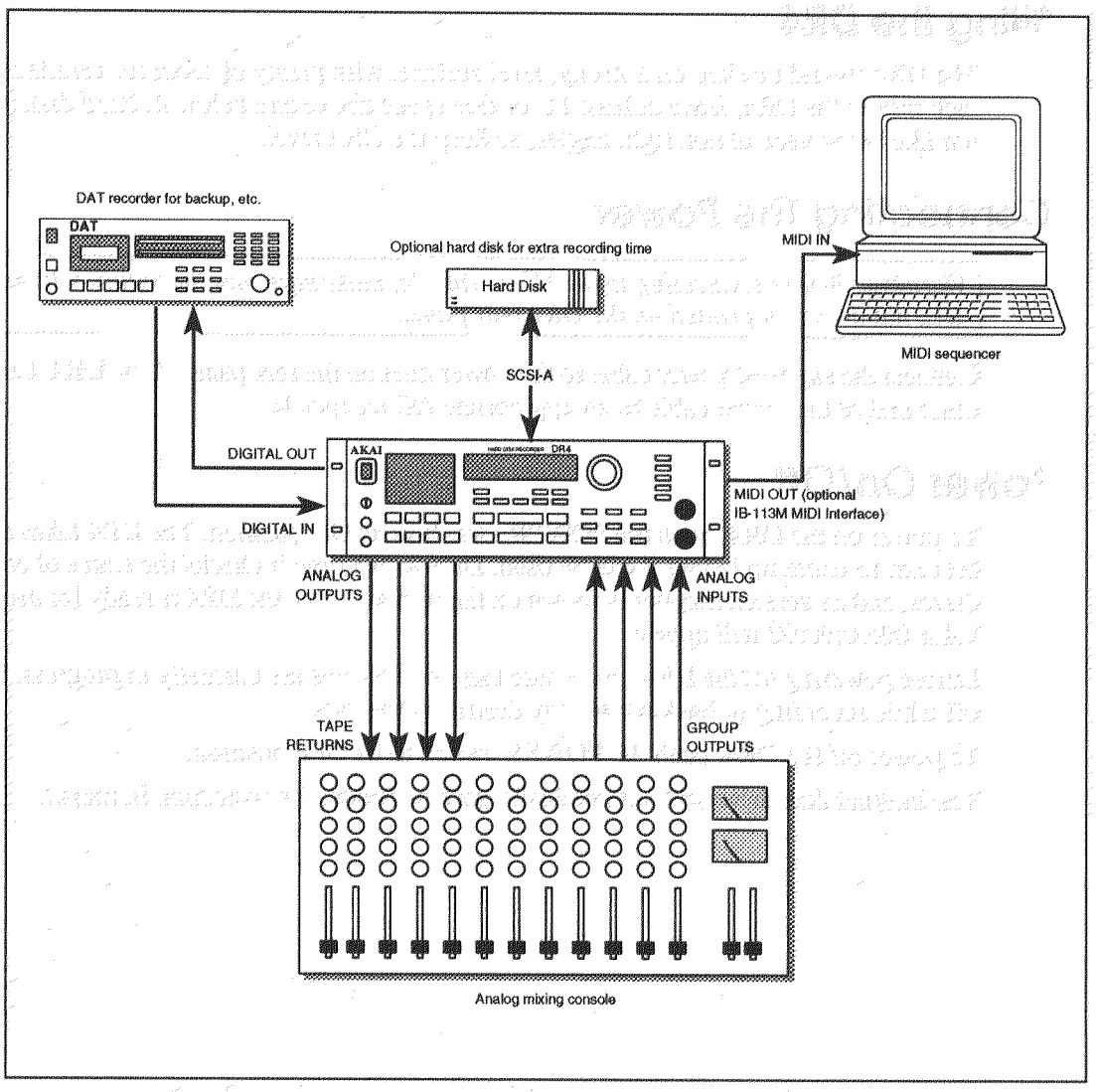
Before powering off the DR4, make sure that no functions are currently in progress. Powering off while recording or backing up may destroy some data.

To power off the DR4, push the POWER switch to its OFF position.

The internal disk drive will automatically park its heads, for protection in transit.

Typical DR4 Setup

The following diagram shows the DR4 in a typical recording setup:



4 Recording

In this chapter, we explain how to record using the DR4. Your DR4 should already have an optional hard disk installed, so you have everything you need. However, the hard disk must be formatted before use. See "Formatting New Disks" on page 50.

Analog Recording Setup

To record via the analog inputs, you must select the analog inputs, then set the sampling frequency.

Sampling Frequency

It is important that you set the sampling frequency before recording. If it is changed after some material has been recorded, that material will playback at the wrong pitch.

The DR4 can record at any one of the three common digital audio sampling frequencies: 32 kHz, 44.1 kHz, and 48 kHz. The deciding factors in your choice of sampling frequency are: application, required audio bandwidth, and available hard disk space. Some information about sampling frequency, applications, and audio bandwidth are provided below. See also "Hard Disk Size" on page 46.

If you intend to backup to DAT, refer to your DAT's operating manual to see which sampling frequencies it can record at via its digital inputs.

48 kHz

This frequency is supported by most professional digital audio equipment and provides an audio bandwidth of about 22 kHz. Consumer type DAT and DCC recorders typically record at this frequency when their analog inputs are used. Use this frequency if you want the highest audio bandwidth. Although, bear in mind that an expensive sampling frequency conversion will be required before your material can be transferred to CD.

44.1 kHz

This frequency is supported by most professional digital audio equipment and provides an audio bandwidth of about 20 kHz. Prerecorded CDs, DCC tapes, and MDs use this frequency. Professional recording studios that utilize digital equipment typically use it. If your DR4 material is destined for distribution on CD, then it's best to use this frequency.

32 kHz

This frequency is widely used for digital broadcast applications where a 15 kHz audio bandwidth, about that of FM radio, is deemed acceptable. It is also used for some DSB (Digital Satellite Broadcasting) applications. It offers the lowest audio bandwidth, but the maximum recording time. It maybe useful for projects where recording time takes precedence over audio bandwidth.

Setting the Sampling Frequency

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the FS key.**
Its indicator will light up, and the current sampling frequency setting will appear on the display.

3) **Use the jog wheel or shuttle control to select a sampling frequency.**
The following sampling frequencies are available:

Sampling Frequency	Display
32 kHz	FS - 32
44.1 kHz	FS - 44.1
48 kHz	FS - 48

4) **Press the STORE/ENT key.**
The new sampling frequency will be selected.

Selecting the Analog Inputs

Source inputs are switched in pairs: 1/2 and 3/4. So, for example, you cannot set input 1 to digital and input 2 to analog simultaneously.

The analog inputs are initially selected when the DR4 is powered on. The four indicators above the INPUT SELECT keys show the current settings for inputs 1/2 and 3/4.

The analog inputs use 1/4 inch stereo phone jacks. They accept balanced and unbalanced signals: Tip = hot, ring = cold, sleeve = ground.

Setting the Input Gain Switch

The gain of the analog inputs is switched in pairs (1/2, 3/4), and can be set to –10 dB or +4 dB.

Set the gain switches to match the level of the incoming signal.

The DR4 does not have any recording level controls. So the signal level must be set on the device that is feeding the DR4 inputs. See "Setting Levels" on page 19.

Digital Recording Setup

To record via the digital inputs, you must set the sampling frequency, select the type of digital input, then select the digital inputs.

Sampling Frequency

To record via the digital inputs, the DR4 must be set to the same sampling frequency as that used by the incoming digital signal. This is because the DR4 has to synchronize with the incoming signal. If you are recording from a CD, prerecorded DCC, or MD, this will be 44.1 kHz. If you are recording from a DAT or DCC that was recorded via analog inputs, this will be 48 kHz.

If the sampling frequency of the incoming digital signal and the DR4 are not the same, the message FSOOPS will appear on the display. In this case, set the DR4 sampling frequency to match that of the incoming digital signal. If you have already recorded some material, then input a digital signal and this message appeared, your existing material will not playback correctly even if you change the DR4 sampling frequency.

> *Note: You can record while the FSOOPS message is displayed. However, since the DR4 time display corresponds to the sampling frequency set on the DR4, the displayed time will not correspond with the actual time.*

To set the sampling frequency, see "Setting the Sampling Frequency" on page 16.

Selecting the Digital Input Connection Type

Digital signals can be input using either XLR or RCA/phono type connections.

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the D IN key for channels 1/2 or 3/4.**
The currently selected digital input will appear on the display.

3) **Use the jog wheel or shuttle control to specify an input.**

Input Connection	Display
XLR	HLr
RCA/phono	rCA

4) **Press the STORE/ENT key.**
The specified input will be selected.

Selecting the Digital Inputs

Source inputs are switched in pairs: 1/2 and 3/4. So, for example, you cannot set input 1 to digital and input 2 to analog simultaneously.

Without an optional IB-11OD Digital Interface card installed, channels 1/2 will also be set to digital inputs when channels 3/4 are selected for digital input. Therefore, you cannot record an analog signal via inputs 1/2 and a digital signal via inputs 3/4 simultaneously. Furthermore, channels 3/4 are fed the same signals as those for channels 1/2 via digital inputs 1/2 (I/O-A). In this case, you can use the channel REC keys to decide which channels record the signals. If all channels are armed for recording, the same signal will be recorded on channels 1 and 3. Likewise, for channels 2 and 4.

With the optional card installed, you can record any number of channels simultaneously, each with individual digital inputs and outputs. In this case, channels 1/2 are handled via DIGITAL I/O-A, and channels 3/4 via DIGITAL I/O-B. However, to record three or four channels simultaneously, both digital inputs must be connected to the same digital audio device, or each device must be wordclock synced. This is because the data received at both digital inputs must be synchronized. If it isn't, noise may be produced.

1) Connect the digital signal to the selected digital input connection.
See "Selecting the Digital Input Connection Type" on page 17.

2) Press the INPUT SELECT DIGITAL key for inputs 1/2 or 3/4.
The DR4 will synchronize to the incoming digital signal.

If the DR4 cannot synchronize to the incoming digital signal, the message no dI G IA will appear on the display. This message means, no digital input signal at I/O-A. If the same problem occurs with I/O-B, the message no dI G Ib will appear on the display. In either case, the DR4 will not work correctly, so check the digital connections on the DR4 and the device sending the digital signal.

Setting the Digital Output Format

Channel signals are output digitally via XLR and RCA/phono type connectors. The format of the digital output signal can be set to either Type 1 or Type 2. Type 1 is sometimes referred to as AES/EBU Professional, and Type 2 as S/PDIF Consumer.

Digital outputs are switched in pairs: 1/2 and 3/4. So, for example, you cannot set output 1 to Type 1 and output 2 to Type 2 simultaneously.

Without the optional IB-11OD Digital Interface, only channel signals 1/2 can be output digitally. If you need to output three or four channels simultaneously via the digital outputs, use the optional interface.

To set the digital output format:

1) Press the SUB-MENU key.
Its indicator will flash.

2) Press the D OUT key for channels 1/2 or 3/4.
The currently set output format will appear on the display.

3) Use the jog wheel or shuttle control to specify a format.

Format	Display
Type 1 (AES/EBU Professional)	tYPE 1
Type 2 (S/PDIF Consumer)	tYPE2

4) Press the STORE/ENT key.
The specified format will be selected.

Arming Channels

To arm channels ready for recording:

1) **Press the respective REC keys.**
The REC keys of armed channels will flash.

Setting Levels

Like most multitrack recorders, the DR4 does not have any recording level controls. So the signal level must be set on the device that is feeding the DR4 inputs. Typically, the group output master faders on a mixing console are used for this.

Set the signal level so that the loudest peaks reach the 3 to 5 dB level on the DR4 bargraphs. If the red 0 dB LED lights up, the level is definitely too high. Digital recorders, unlike their analog tape counterparts, produce unpleasant signal distortion when maximum levels are exceeded. So take care, any signal distortion will be recorded to disk. When recording vocals and acoustic instruments, which are prone to sudden level changes, a signal compressor can be used to keep signal levels under control.

If you are recording from a digital source, you probably won't be able to adjust the signal level. However, some digital audio equipment, including Akai's DD1000, does allow some degree of digital level control.

Starting & Stopping Recording

To start recording:

1) **Press and hold down the REC key, then press the play key.**
The REC key and the channel REC keys of any armed tracks will light up, indicating that recording is in progress.

2) **Press the stop key to stop recording.**

Manual Punch In/Out

Manual punch in/out allows you to punch in and punch out once during playback.

1) **Set up the DR4 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

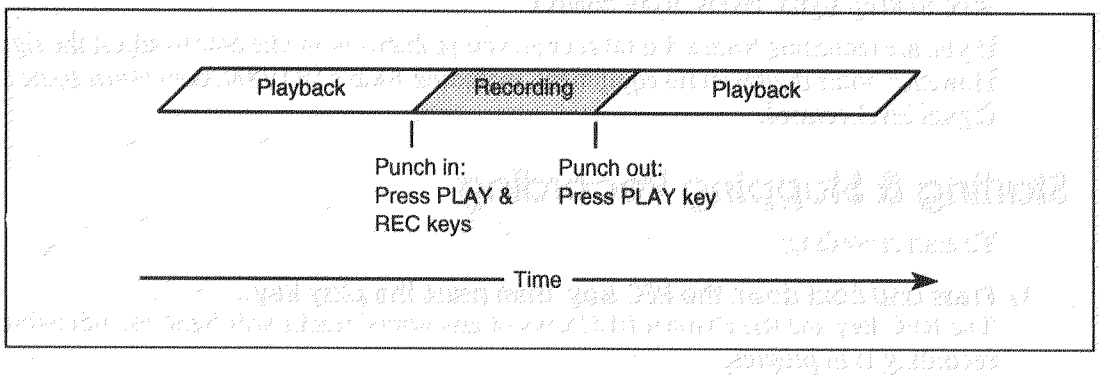
2) **Arm the channel that you want to use for punch in/out.**
The REC key of an armed channel will flash.

3) **Rewind to a position before the point at which you want to punch in.**

4) **Press the play key to start playback.**

5) **When the desired punch in point is reached, press and hold down the play key, then press the REC key.**
Punch in will occur as soon as the REC key is pressed.

6) **Press the play key again to punch out.**
The following diagram shows the procedure for manual punch in/out:



Manual Punch In/Out Notes

When a manual punch out is performed with the auto monitor function set to on, the monitor output will be interrupted momentarily as the monitor switches from source to playback. The recorded material is not affected by this.

There is a limit to the smallest interval allowed between the in point and the out point. See "In Point & Out Point Notes" on page 12.

When you punch in and punch out, the in point and out point values are updated automatically. If you are trying a difficult punch in/out, perform a the manual punch in/out with the rehearsal function on, then confirm the punch in/out points using the auto punch in/out function. If they are OK, switch off the rehearsal function, then perform an auto punch in/out.

Manual punch in/out operations cannot be performed repeatedly during playback. Once you have punched out, you cannot punch in again without first stopping, then restarting playback.

Footswitch Punch In/Out

Manual punch in/out can also be carried out using a footswitch, especially useful if you are playing an instrument and operating the DR4 simultaneously.

1) **Connect a footswitch to the FOOT SW connection on the front panel.**

2) **Set up the DR4 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

3) **Arm the channel that you want to use for punch in/out.**
The REC key of an armed channel will flash.

4) **Rewind to a position before the point at which you want to punch in.**

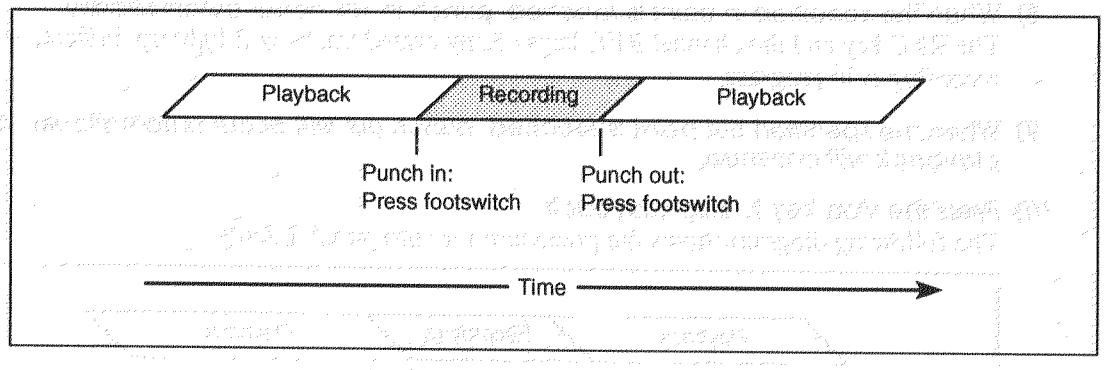
5) **Press the play key to start playback.**

6) **When the desired punch in point is reached, press the footswitch.**
Punch in will occur as soon as you press the footswitch.

7) **Press the footswitch again to punch out.**

> *Note: Pressing the footswitch again will not punch in, it will stop playback. You cannot punch in/out continuously during playback. To punch in again, stop, then restart playback.*

8) **Press again to stop playback.**
The following diagram shows the procedure for footswitch punch in/out:



Auto Punch In/Out

Auto punch in/out allows you to automatically punch in and punch out at the specified in and out points. This is useful when you need greater accuracy than that possible using manual punch in/out. It also allows you to repeat a punch in/out until you are happy with the result.

1) **Set up the DR4 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

2) **Arm the channel that you want to use for punch in/out.**
The REC key of an armed channel will flash.

3) **To set the in point, display the desired time on the display, press the STORE/ENT key, then press the IN POINT key.**
See "Specifying the In Point & Out Point" on page 12.

4) **To set the out point, display the desired time on the display, press the STORE/ENT key, then press the OUT POINT key.**
See "Specifying the In Point & Out Point" on page 12.

5) **Press the AUTO PUNCH key.**
Its indicator will light up.

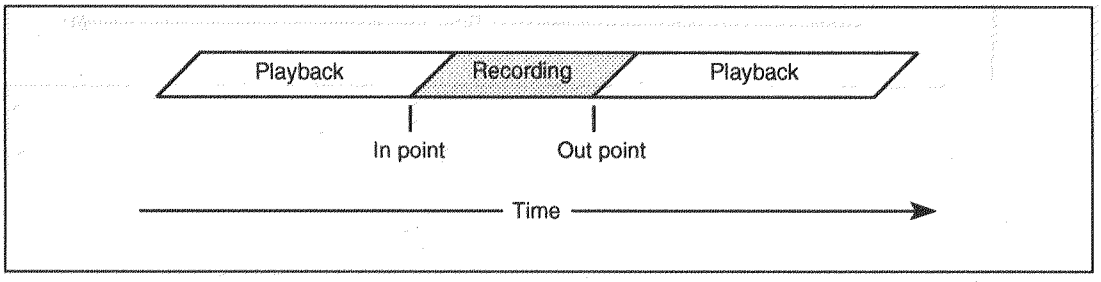
6) **Rewind to a position before the specified in point.**

7) **Press the play key to start playback.**

8) **When the specified in point is reached, punch in will occur automatically.**
The REC key and the channel REC keys of any armed tracks will light up, indicating that recording is in progress.

9) **When the specified out point is reached, punch out will occur automatically, and playback will continue.**

10) **Press the stop key to stop playback.**
The following diagram shows the procedure for auto punch in/out:



Auto Punch In/Out Notes

The auto punch in/out function is switched off automatically after it has been used.

Make sure that you start playback from a point before the specified in point. Otherwise, auto punch in/out cannot be performed.

Auto Monitor

The auto monitor function provides automatic monitor signal switching for playback and recording. For convenient monitoring, this can be set to on. However, if you want to monitor a source signal during playback, for example, to practice while listening to other channels before recording, it must be switched off.

The following table shows auto monitor operation under various conditions:

Auto Monitor	Channel REC key	Stop	Playback	Recording
ON	ON (channel armed)	Source	Playback	Source (recording)
	OFF	No Output	Playback	Playback
OFF	ON (channel armed)	Source	Source	Source (recording)
	OFF	No Output	Playback	Playback

Rehearsal

The rehearsal function allows you to practice a recording before actually recording anything to disk. This is useful when used with automatic punch in/out for checking punch in/out points.

With the REHEARSAL function on, you start recording as normal. When the specified in point is reached, the monitor signal is switched. However, nothing is actually recorded to disk. When the specified out point is reached, the monitor signal is switched again.

To record for real, switch off the REHEARSAL function, then start recording as normal.

Recording Undo

If you record some new material over some existing material, and then decide that you preferred the original, this undo function can be used to restore the original. In fact, you can switch between the original and the new during playback for comparison. This is possible because the DR4 always records new material on a different area of the hard disk.

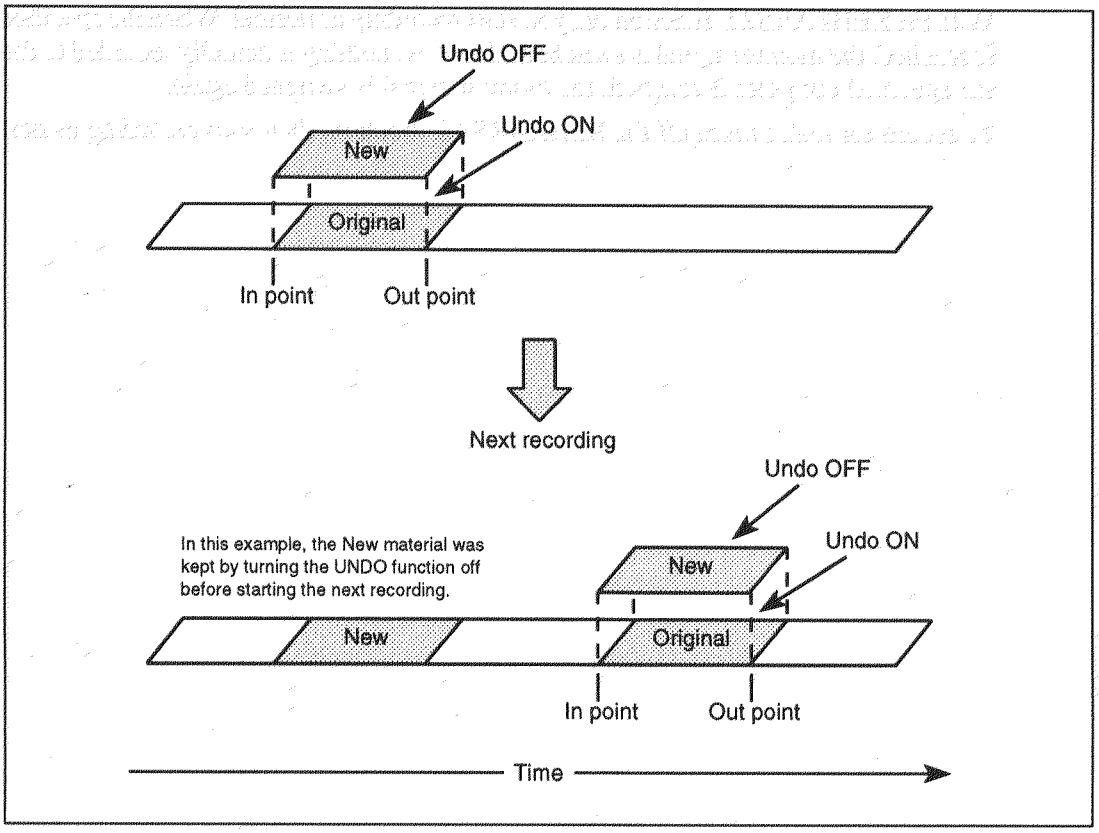
Operation

After each recording, the DR4 will play the new material. To play the original material, press the UNDO key. The UNDO indicator will light up. Press again to switch back to the new material. The UNDO indicator will go off.

Before starting another recording or performing an edit, you must decide which material you want to keep: the original or the new. For once a new recording or edit function is performed, the undo function will apply to that new recording or edit.

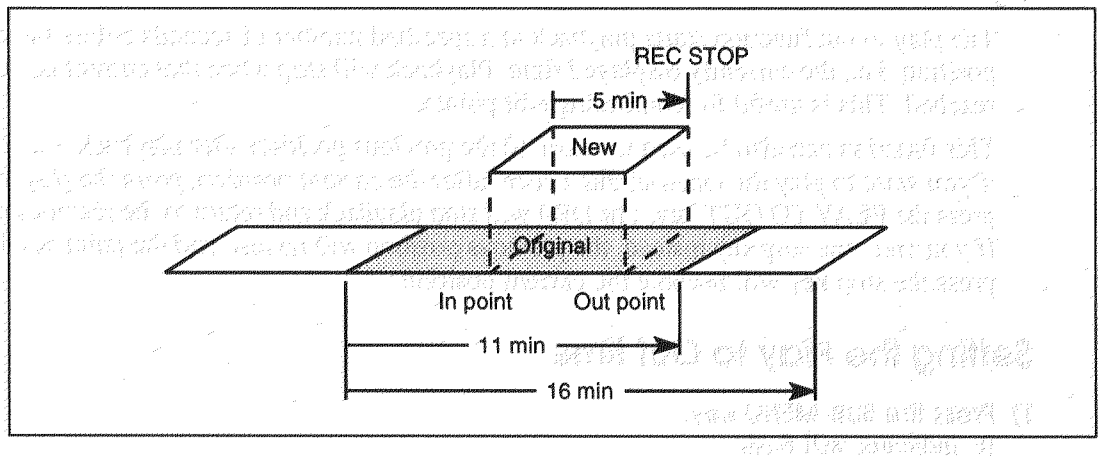
Once you've decided, leave the UNDO function set as required, then make a new recording or use an edit function. If you don't record anything new or make any edits, you will be able to undo the last recording even after the DR4 has been powered off and on.

The following diagram shows how the recording undo function works:



Recording over Existing Material

In the following example, 11 out of 16 minutes have been recorded, and a new recording made on the original 11 minute section. After 5 minutes the new recording stopped because all the hard disk space had been used up. The message REC STOP appeared on the display. However, the MEMORY sub-menu function still indicates 5 minutes available for recording. This is because the new 5 minute section will actually replace part of the original 11 minute section, depending whether you choose to keep the new (undo off) or original (undo on). Either way, you'll still be able to record for another 5 minutes.



Available Recording Time Display

To check the available recording time:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the MEMORY key.**
With all the channel REC keys set to off, the total amount of recording time available will be displayed.

As each channel REC key is pressed, the amount of recording time available to each armed channel will be displayed.

5 Playback

In this chapter, we explain some functions that apply to playback only.

Starting & Stopping

Press the play key to start playback, and the key to stop it.

Play to Out

The play to out function starts playback at a specified number of seconds before the current position, i.e., the currently displayed time. Playback will stop when that current position is reached. This is useful for confirming edit points.

This function can also be used to return to the previous position after playback. For example, if you want to play the material that occurs after the current position, press the play key, then press the PLAY TO OUT key. The DR4 will stop playback and return to the previous position. If you press the stop key instead, the previous position will be lost, and the point at which you press the stop key will become the current position.

Setting the Play to Out time

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the play TO OUT key.**
The play to out time will appear on the display.

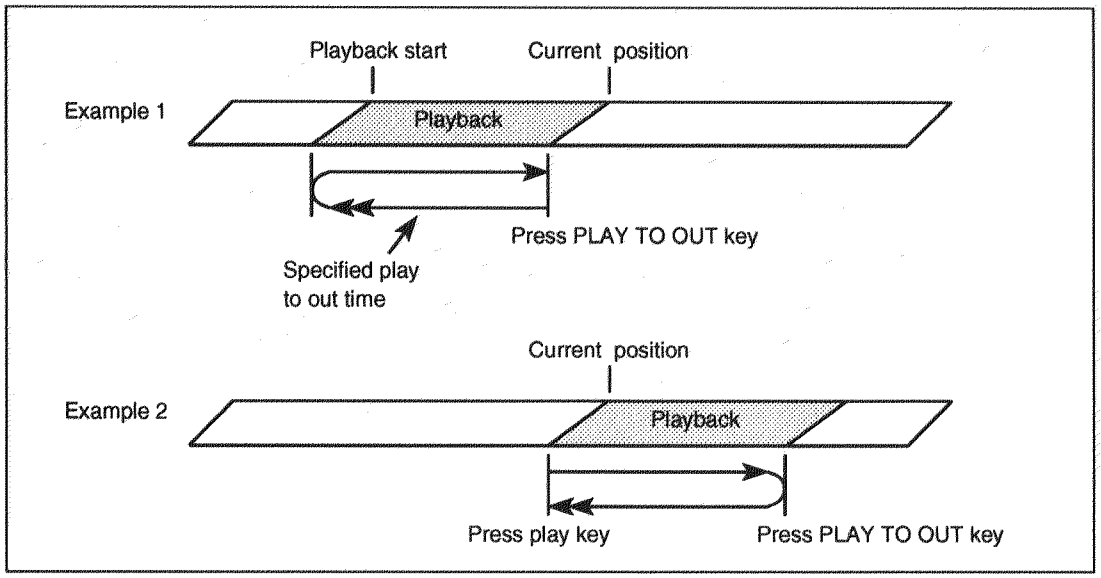
3) **Use the jog wheel, shuttle control, or number keypad to specify a time.**
The play to out time can be set from 1 to 99 seconds.

4) **Press the STORE/ENT key.**
The specified time will be entered.

Operation

1) **Press the play TO OUT key.**
Playback will start the specified number of seconds before the current position, continue up to that current position, and then stop.

The following diagram shows how the play to out function works:



Repeat

The repeat function allows you to repeatedly play the material that occurs between the in point and out point. Unlike the repeat function found on tape based recorders, the DR4 does not have to rewind when the out point is reached. So repeat playback is continuous. You can even use it to experiment with, for example, drum loops. In fact, by using the repeat function to perfect loop points, and the edit functions to copy, etc., you could create a complete drum track using just the DR4.

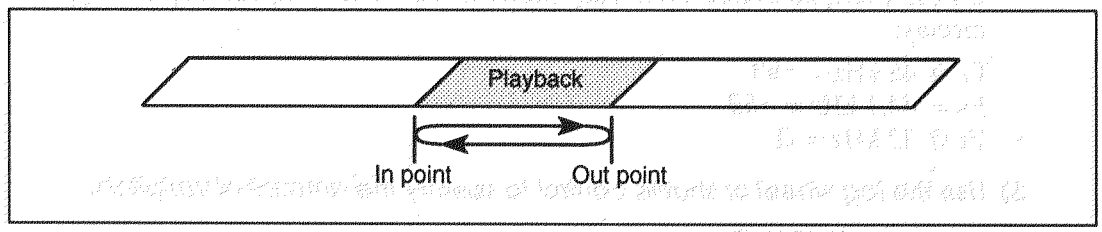
Operation

1) **To set the in point, display the desired time on the display, press the STORE/ENT key, then press the IN POINT key.**
See "Specifying the In Point & Out Point" on page 12.

2) **To set the out point, display the desired time on the display, press the STORE/ENT key, then press the OUT POINT key.**
See "Specifying the In Point & Out Point" on page 12.

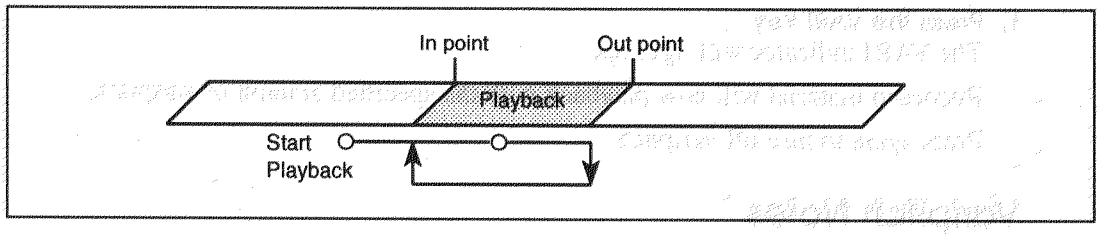
3) **Press the REPEAT key.**
Its indicator will light up.

4) **Press the play key to start repeat playback.**

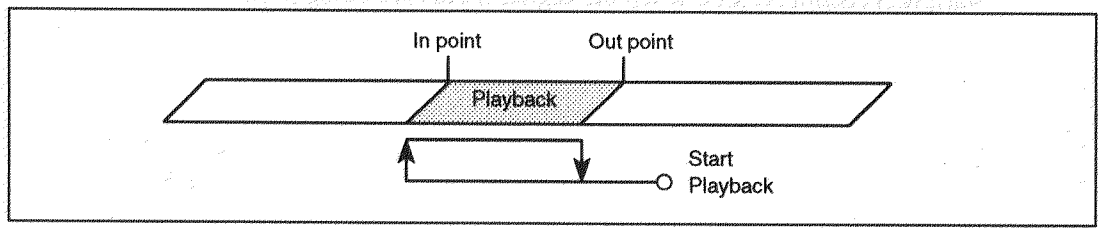


Repeat Playback Notes

If you start repeat playback at a position before the in point, or at a position between the in point and out point, playback will start from the current position, proceed up to the out point, then start repeating.



If you start repeat playback at a position after the out point, playback will start immediately from the in point.



Varipitch

The varipitch function allows you to vary the pitch of recorded material during playback. The amount of varipitch available depends on the selected sampling frequency. There are 64 varipitch steps between sampling frequencies 32 kHz and 48 kHz.

Sampling Frequency	Varipitch Step Range	Varipitch Range
48 kHz	–64 ~ 0	–33.33% ~ 0
44.1 kHz	–53 ~ –1 / +1 ~ +12	–27.44% ~ –0.49% / +0.23% ~ +8.84%
32 kHz	0 ~ +64	0 ~ +50%

As you can see, the pitch can be increased and decreased at 44.1 kHz. However, at 32 kHz it can be increased only, and at 48 kHz, decreased only.

Setting the Amount of Varipitch

To set the amount of varipitch:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the VARI key.**
Unless a varipitch value has already been set, the lowest varipitch step will appear on the display:

Fs @ 48 kHz = -64
Fs @ 44.1 kHz = -53
Fs @ 32 kHz = 0

3) **Use the jog wheel or shuttle control to specify the amount of varipitch.**

4) **Press the STORE/ENT key.**
The specified value will be set.

Operation

To use varipitch:

1) **Press the VARI key.**
The VARI indicator will light up.

Recorded material will now playback with the specified amount of varipitch.

Press again to turn off varipitch.

Varipitch Notes

The amount of varipitch cannot be adjusted while playback is in progress.

Varipitch cannot be used when the digital inputs are being used.

6 Locate Functions

In this chapter, we explain how to use the DR4's locate functions. You can locate to a specific point just by entering the time on the display, store and recall up to eight direct locate points using the number keypad, and store and recall up to 100 stack locate points. Unlike tape based recorders, the DR4 does not need to rewind or fast forward to locate specific points. DR4 locate functions are instantaneous.

Locating to a Specific Point

To locate to a specific point:

1) **Press the LOCATE key.**
-------- will appear on the display.

2) **Use the number keypad to enter the desired time.**
Time values should be entered from left to right. For example, to enter the time 15 minutes 32 seconds 20 frames, press these number keys in the following order: 1, 5, 3, 2, 2, 0.

If you make a mistake while entering the time, press the RESET key, then reenter the time.

3) **Press the STORE/ENT key.**
The DR4 will locate to the specified point.

Direct Locate Points (1 ~ 8 Keys)

Up to eight direct locate points can be stored and recalled using the 1 to 8 number keys. These are called direct locate points because you can locate to the stored point directly, just by pressing the respective number key.

Storing Direct Locate Points

To store a direct locate point:

1) **Display the desired time on the display.**
2) **Press the STORE/ENT key.**
   The display and indicators for number keys 1 to 8 will flash.
3) **Press a number key to store the direct locate point.**

Storing Direct Locate Points On-the-Fly

To store a direct locate point during playback:

1) **Press the STORE/ENT key when the desired time is reached.**
   The display and indicators for number keys 1 to 8 will flash.
2) **Press a number key to store the direct locate point.**
   Playback will continue uninterrupted while you enter the point.

Recalling Direct Locate Points

To recall a direct locate point:

1) **Press the corresponding 1 to 8 number key.**
   The DR4 will locate to the stored point.

Stack Locate Points

Up to 100 stack locate points can be stored and recalled. These points are identified using a two-digit number (00 to 99).

Storing Stack Locate Points

To store a stack locate point:

1) **Display the desired time on the display.**

2) **Press the STORE/ENT key.**
The display and indicators for number keys 1 to 8 will flash.

3) **Press the STACK key.**
. . . will appear on the display.

4) **Enter a two-digit number.**
The stack locate point will be stored.

Storing Stack Locate Points On-the-Fly

To store a stack locate point during playback:

1) **Press the STORE/ENT key when the desired time is reached.**
The display and indicators for number keys 1 to 8 will flash.

2) **Press the STACK key.**
will appear on the display.

3) **Enter a two-digit number.**
The stack locate point will be stored.

Playback will continue uninterrupted while you enter the point.

Recalling Stack Locate Points

To recall a stack locate point:

1) **Press the STACK key.**

2) **Enter the corresponding two-digit number.**
The DR4 will locate to the stored point.

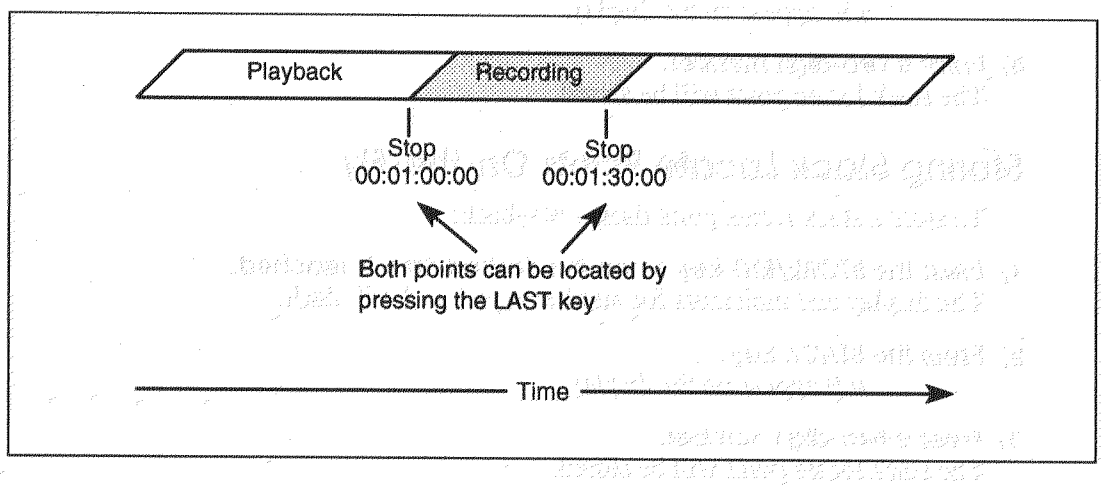
If no time value has been stored, the DR4 will locate to *00000000*

Last Memory

The last memory function allows you locate to the last two points at which the stop key was pressed. This can be used to return to the previous point after locating to a different point, or after playing, recording, rewinding, and fast forwarding. It can also be used when checking direct and stack locate points. First, locate to the point that you want to check, then press the LAST key to return to the previous point.

In addition, this function can be used to check whether a recording was successful. When you stop recording, pressing the LAST key will return to the point at which recording started (presuming that the stop key was pressed before recording). Pressing the LAST key again will locate to the point at which recording was stopped.

The following diagram shows how the last memory function can be used to locate to the start and end points of a recording:



Preroll

The preroll function allows you to locate to a point a few seconds before the specified locate point. For example, if the preroll value is set to 5, and the preroll function is on, the DR4 will locate to a position 5 seconds before the specified locate point.

Setting the Preroll Time

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the PREROLL key.**
Its indicator will light up, and the current preroll setting will appear on the display.

3) **Use the jog wheel, shuttle control, or number keypad to set the preroll time.**
Preroll time can be set from 1 to 99 seconds.

4) **Press the STORE/ENT key.**
The new preroll time will be entered.

Operation

1) **Press the PREROLL key.**
Its indicator will light up.

The next time you locate to a point, the preroll time will be taken into account.

7 Time Display

The DR4 can display time in any one of three ways: absolute, relative, and BBC:

Absolute Time (ABS)

Absolute time effectively starts at the beginning of the hard disk at zero, and is fixed.

Relative Time (REL)

Relative time, although referenced to absolute time, can be reset to zero at any point, or offset from absolute time by a specified amount. When using MIDI or SMPTE synchronization, relative time can be used to offset the DR4.

Bars, Beats, Clocks Display (BBC)

BBC display is intended for use with MIDI synchronization. See "MIDI Synchronization" on page 56.

The ABS/REL key is used to switch between absolute time and relative time, and the BBC DISPLAY key is used to switch between time display and BBC display.

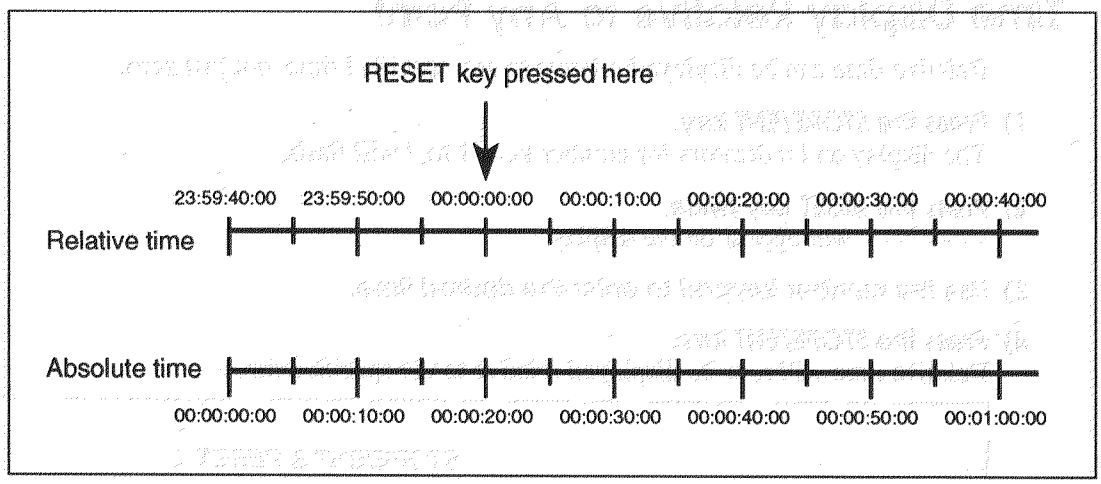
Setting Relative Time to Zero

To set the relative time to zero:

1) **Locate the point at which you want to set relative time to zero.**

2) **Press the RESET key.**
If it is not already, relative time will be selected automatically, and set to *00000000*

To return to absolute time, press the ABS/REL key.



If you accidentally press the RESET key while using relative time, the absolute time will be shown. Press the RESET key again to restore the relative time.

Using the RESET key to set the relative time means that you cannot set the relative time at a point before absolute zero. This is because the relative zero can only be set at a point after the absolute zero. To set relative time to a point before absolute zero, use the offset function. See "Setting a Relative Time Offset" on page 34.

Setting a Relative Time Offset

The relative time can also be set by specifying an offset:

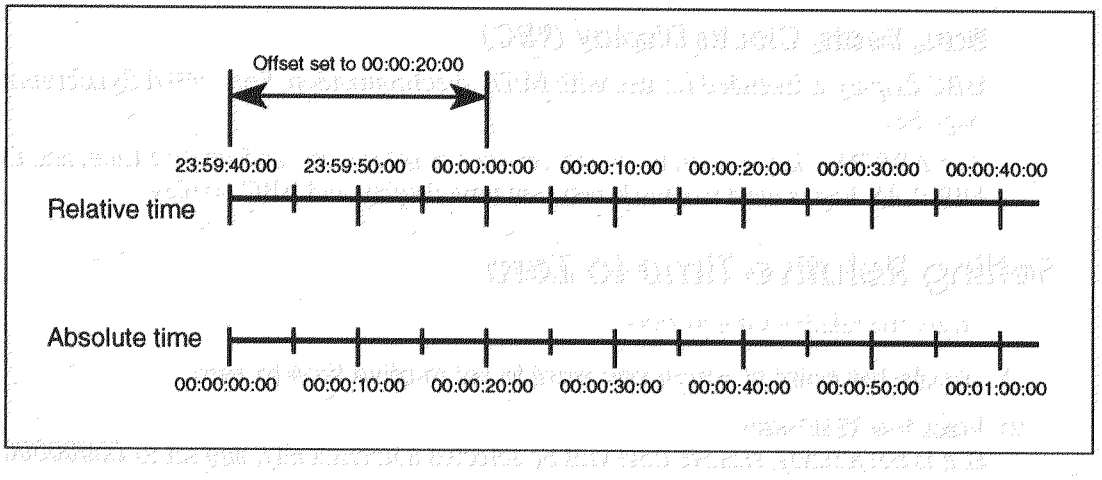
1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the OFFSET key.**

3) **Use the jog wheel, shuttle control, or number keypad to specify the offset.**

4) **Press the STORE/ENT key.**
Relative time will now be displayed with the specified offset.

The following diagram shows relative time with a 20 second offset:



Time Display Relative to Any Point

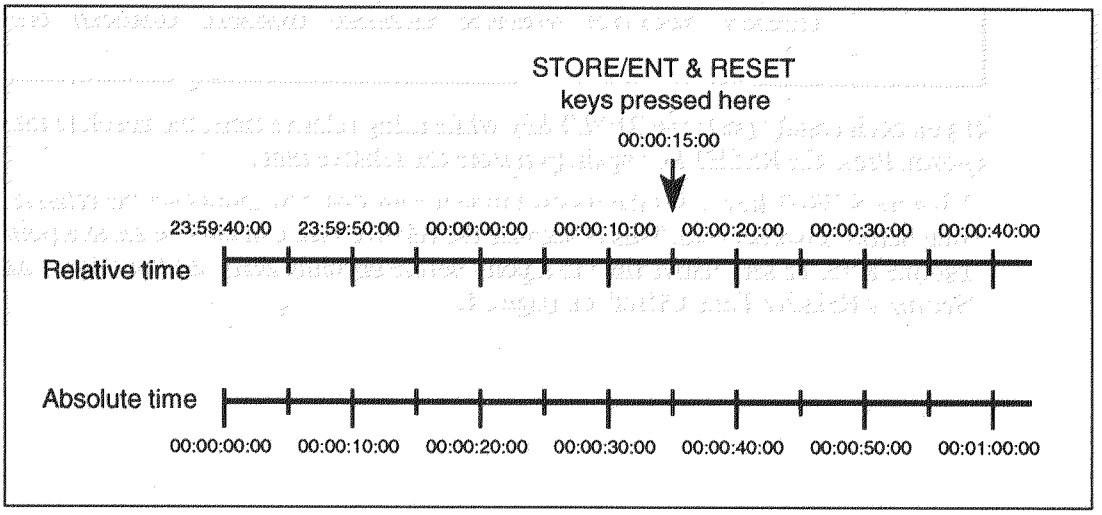
Relative time can be displayed relative to any specified time, not just zero:

1) **Press the STORE/ENT key.**
The display and indicators for number keys 1 to 8 will flash.

2) **Press the RESET key twice.**
-------- will appear on the display.

3) **Use the number keypad to enter the desired time.**

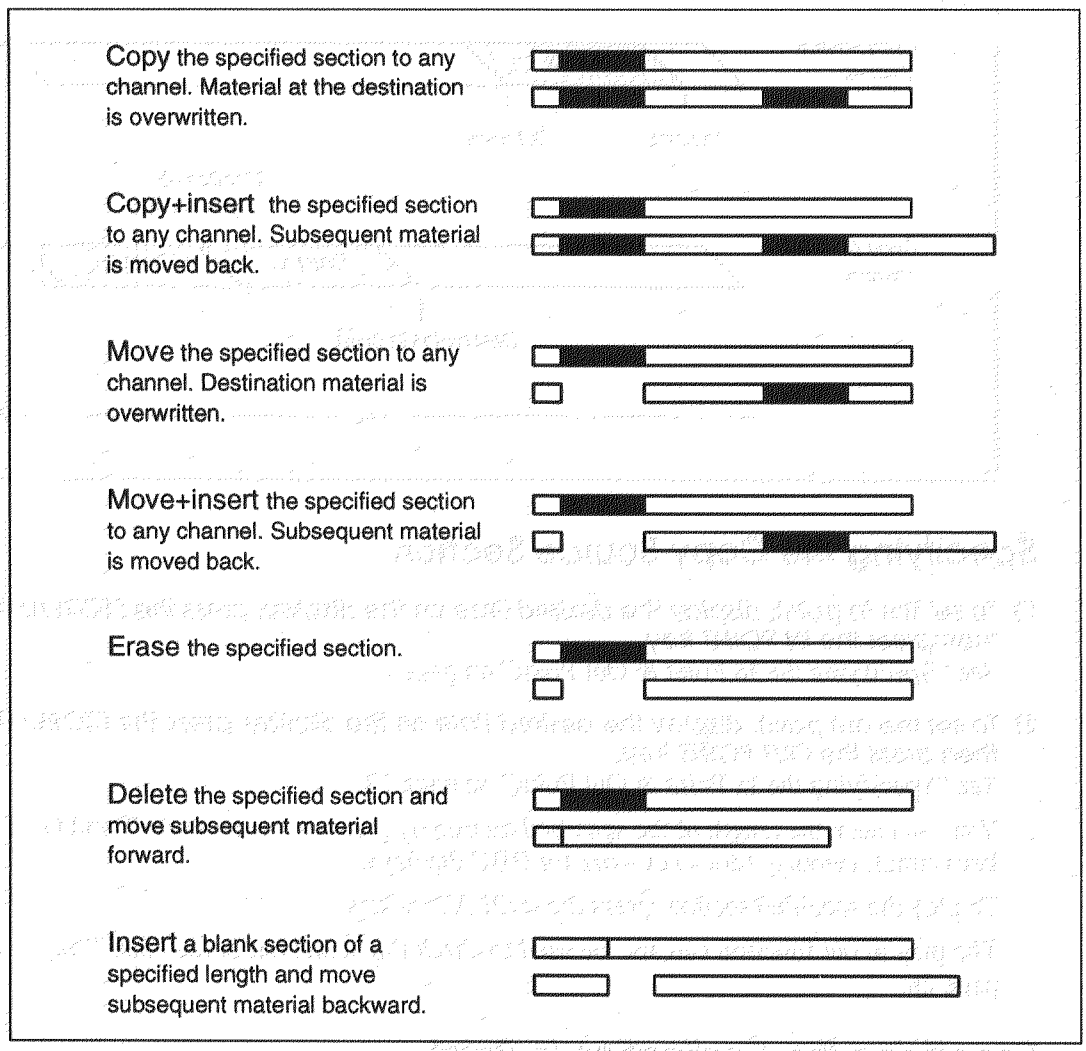
4) **Press the STORE/ENT key.**
Relative time will now be displayed relative to the specified time.



8 Editing

In this chapter, we explain the editing functions.

There are seven edit functions: copy, copy+insert, move, move+insert, erase, delete, and insert:


Copy the specified section to any channel. Material at the destination is overwritten.
Copy+insert the specified section to any channel. Subsequent material is moved back.
Move the specified section to any channel. Destination material is overwritten.
Move+insert the specified section to any channel. Subsequent material is moved back.
Erase the specified section.
Delete the specified section and move subsequent material forward.
Insert a blank section of a specified length and move subsequent material backward.

Undoing an Edit

Before looking at each edit function, we'll explain how to undo an edit. This can be used when edits don't turn out as planned. It also gives you the freedom to experiment with edits. Undoing an edit is much like undoing a recording. See "Recording Undo" on page 24.

To undo an edit:

1) **Press the UNDO key.**
The UNDO indicator will light up. While this indicator is lit, the DR4 will play the material as it was before the edit.

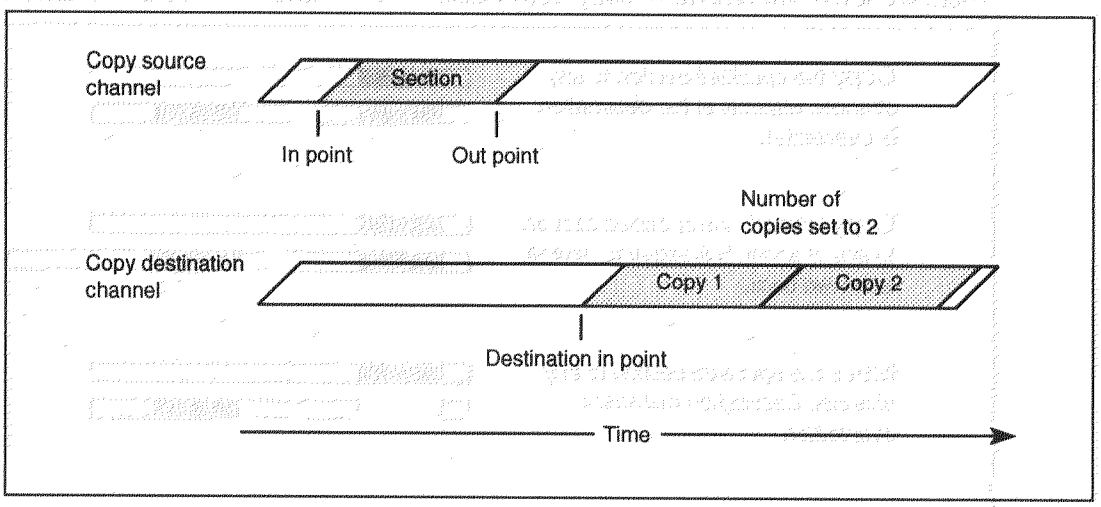
To switch back to the edited material:

2) **Press the UNDO key again.**
Before performing another edit or starting another recording, you must decide whether you want to keep the edit or not. For once another edit or recording is made, the undo function will apply to that new edit or recording.

Once you've decided, leave the UNDO function set as required, then perform another edit or start a new recording. If you don't make any more edits or record anything new, you will be able to undo the last edit even after the DR4 has been powered off and on.

Copy

The start point and end point of the section to be copied are identified using the in point and out point respectively. The following diagram shows the copy procedure:



Specifying the Copy Source Section

1) **To set the in point, display the desired time on the display, press the STORE/ENT key, then press the IN POINT key.**
See "Specifying the In Point & Out Point" on page 12.

2) **To set the out point, display the desired time on the display, press the STORE/ENT key, then press the OUT POINT key.**
See "Specifying the In Point & Out Point" on page 12.

You can check the length of the specified section by pressing the IN POINT and OUT POINT keys simultaneously (does not work for BBC display).

To play the specified section, press the <<PLAY>> key.

The play to out function can also be used to check the in and out points. See "Play to Out" on page 26.

Specifying the Destination In Point

3) **Display the desired in point for the destination.**

4) **Press the EDIT key to select the copy function.**
The COPY indicator will light up, and `Edit` will appear on the display.

5) **Press the STORE/ENT key.**
The destination in point will be stored.

Specifying the Number of Repeats

While `rEPEAtO1` is displayed on the display:

6) **Use the jog wheel or shuttle control to specify the number of times that you want to repeat the copied section.**
The number of repeats can be set from 1 to 99.

Selecting the Source & Destination Channels

The INPUT SELECT keys are used to select the copy source, and the channel REC keys are used to select the copy destination.

You can copy one channel or a number of channels simultaneously.

7) **Use the INPUT SELECT keys to select the copy source channels.**
The corresponding indicators will light up.

8) **Use the channel REC keys to select the copy destination channels.**
The corresponding indicators will light up.

If only one channel is selected as a source, only one destination channel can be selected.

If two channels are selected as sources, two destination channels can be selected.

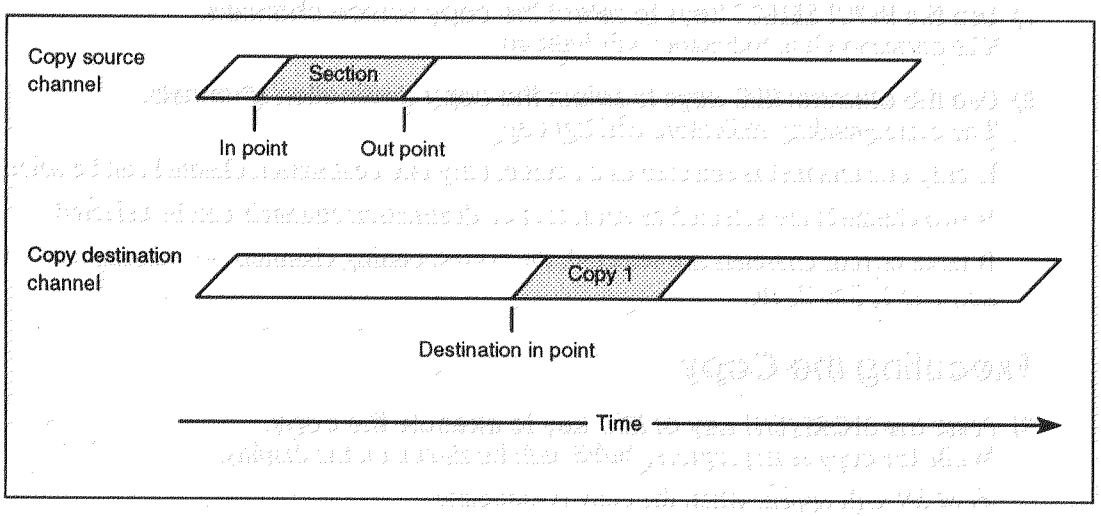
If three or four channels are selected, the corresponding channels are automatically selected, i.e., 1 to 1, 2 to 2, etc.

Executing the Copy

9) **Press the STORE/ENT key or REC key to execute the copy.**
While the copy is in progress, bUSY will be shown on the display.
FInISH will appear when the copy is complete.

Copy+Insert

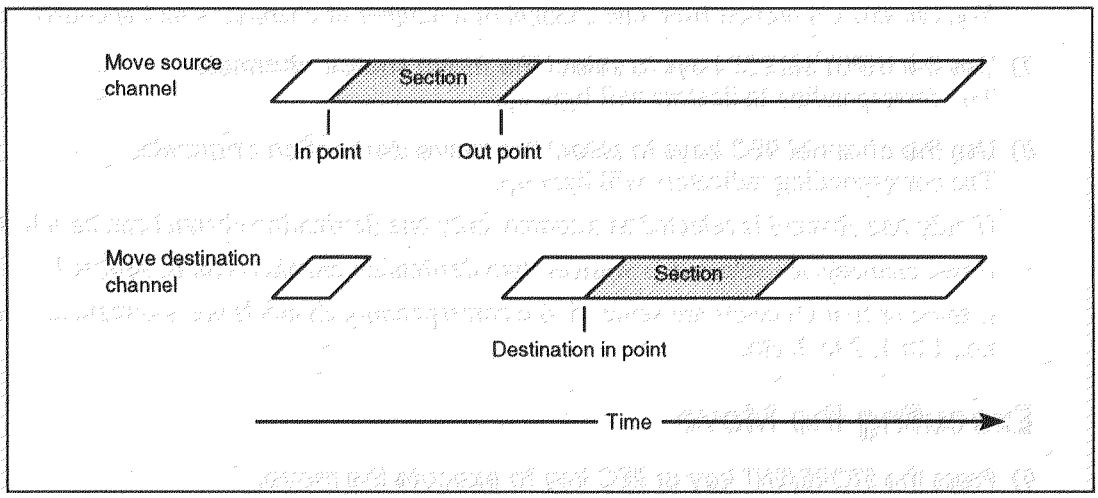
The copy+insert function works basically the same as the copy function. However, unlike the copy function that overwrites any existing material at the specified destination, the copy+insert function moves any existing material back. The following diagram shows the procedure for copy+insert:



Follow the procedure for "Copy" on page 36. At step 4, select the copy+insert function.

Move

The start point and end point of the section to be moved are identified using the in point and out point respectively. The following diagram shows the procedure for move:



Specifying the Section to Move

1) **To set the in point, display the desired time on the display, press the STORE/ENT key, then press the IN POINT key.**
See "Specifying the In Point & Out Point" on page 12.

2) **To set the out point, display the desired time on the display, press the STORE/ENT key, then press the OUT POINT key.**
See "Specifying the In Point & Out Point" on page 12.

You can check the length of the specified section by pressing the IN POINT and OUT POINT keys simultaneously (does not work for BBC display).

To play the specified section, press the <<PLAY>> key.

The play to out function can also be used to check the in and out points. See "Play to Out" on page 26.

Specifying the Destination In Point

3) **Display the desired in point for the destination.**

4) **Press the EDIT key repeatedly to select the move function.**
The MOVE indicator will light up, and EdIt will appear on the display.

5) **Press the STORE/ENT key.**
The destination in point will be stored.

Specifying the Number of Repeats

While rEPEAtO1 is displayed on the display:

6) **Use the jog wheel or shuttle control to specify the number of times that you want to repeat the moved section.**
The number of repeats can be set from 1 to 99.

Selecting the Source & Destination Channels

The INPUT SELECT keys are used to select the move source, and the channel REC keys are used to select the move destination.

You can move a section from one channel or a number of channels simultaneously.

7) Use the INPUT SELECT keys to select the move source channels.
The corresponding indicators will light up.

8) Use the channel REC keys to select the move destination channels.
The corresponding indicators will light up.

If only one channel is selected as a source, only one destination channel can be selected.

If two channels are selected as sources, two destination channels can be selected.

If three or four channels are selected, the corresponding channels are automatically selected, i.e., 1 to 1, 2 to 2, etc.

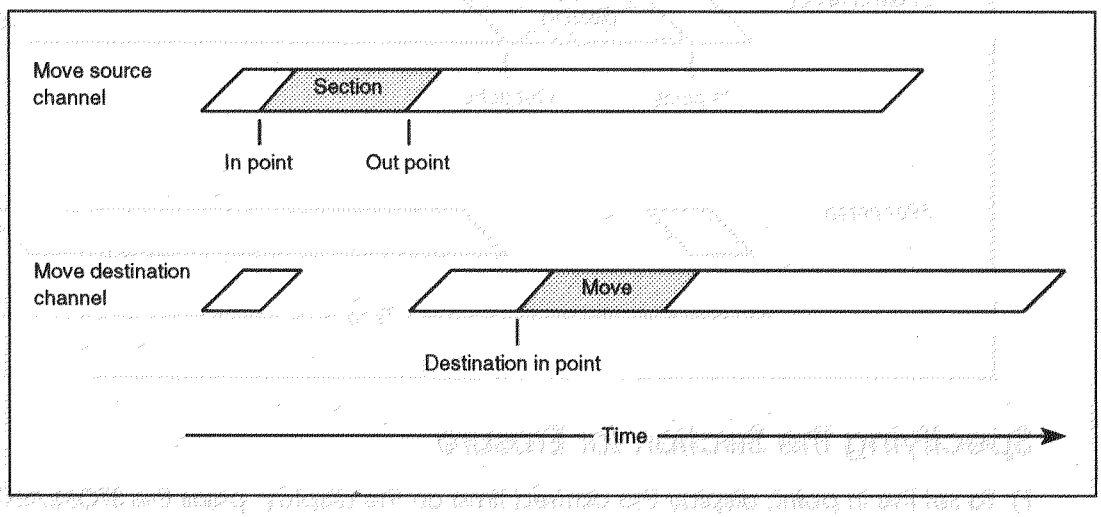
Executing the Move

9) Press the STORE/ENT key or REC key to execute the move.
While the move is in progress, bUSY will be shown on the display.

FInISH will appear when the move is complete.

Move+Insert

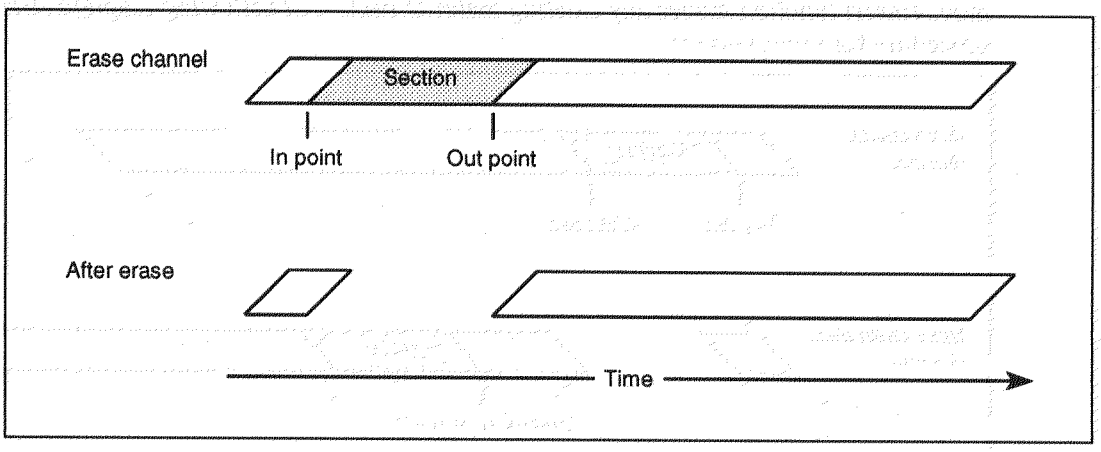
The move+insert function works basically the same as the move function. However, unlike the move function that overwrites any existing material at the specified destination, the move+insert function moves any existing material back. The following diagram shows the procedure for move+insert:



Follow the procedure for "Move" on page 39. At step 4, select the move+insert function.

Erase

The start point and end point of the section to be erased are identified using the in point and out point respectively. The following diagram shows the procedure for erase:



Specifying the Section for Erasure

1) **To set the in point, display the desired time on the display, press the STORE/ENT key, then press the IN POINT key.**
The in point will be stored.

2) **To set the out point, display the desired time on the display, press the STORE/ENT key, then press the OUT POINT key.**
The out point will be stored.

You can check the length of the specified section by pressing the IN POINT and OUT POINT keys simultaneously (does not work for BBC display).

To play the specified section, press the <<PLAY>> key.

The play to out function can also be used to check the in and out points. See "Play to Out" on page 26.

3) **Press the EDIT key repeatedly to select the erase function.**
The ERASE indicator will light up, and `Edit` will appear on the display.

4) **Press the STORE/ENT key.** `ErASE` **will appear on the display.**

Selecting Channels for Erasure

5) **Use the channel REC keys to select channels for erasure.**
The corresponding indicator will light up.

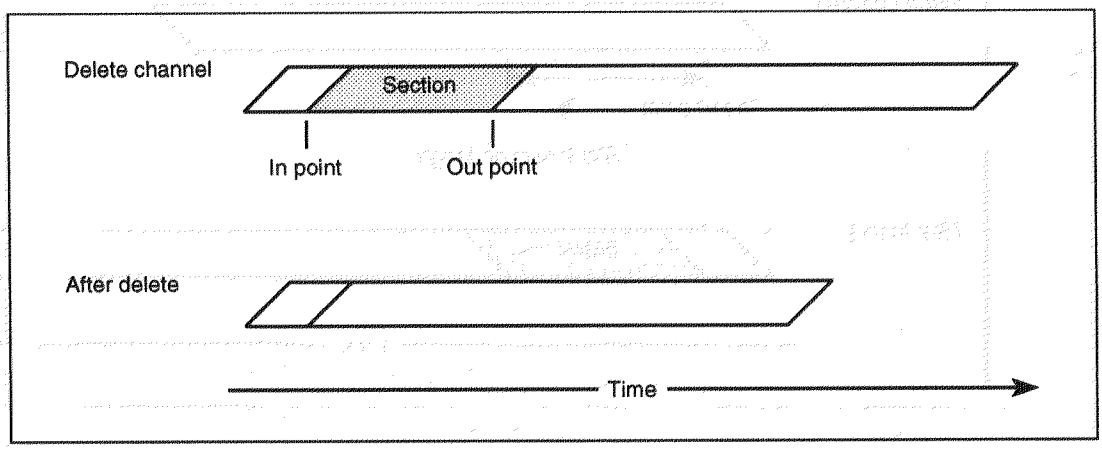
Executing Erase

6) **Press the STORE/ENT key or REC key to execute erase.**
While erasing is in progress, `bUSY` will be shown on the display.

`FInISH` will appear when erase is complete.

Delete

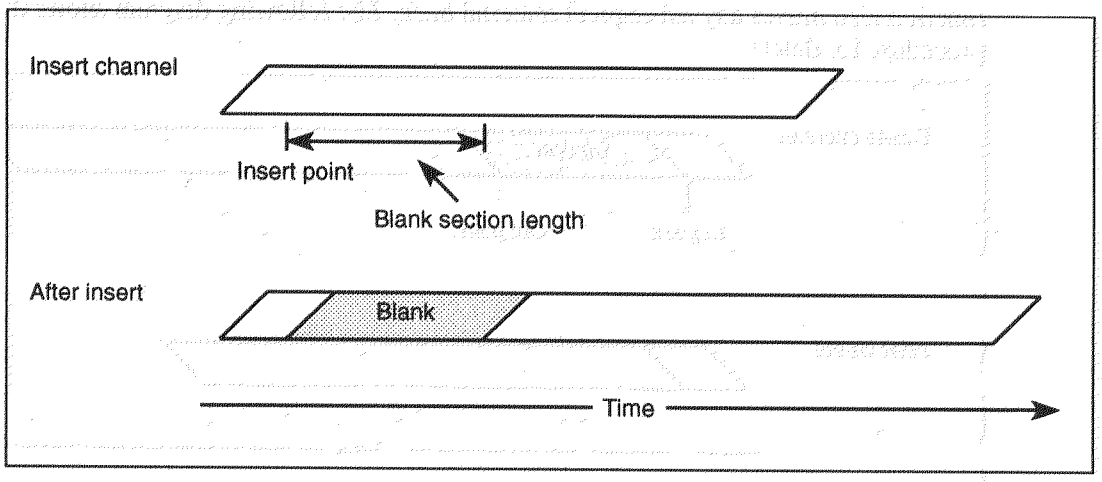
The delete function works basically the same as the erase function. However, the delete function also moves any subsequent material back. The following diagram shows the procedure for delete:



Follow the procedure for "Erase" on page 42. At step 3, select the delete function.

Insert

The following diagram shows the procedure for insert:



Specifying the Insert In Point

1) To set the in point, display the desired time on the display.

2) Press the EDIT key repeatedly to select the insert function.
The INSERT indicator will light up, and `Edit` will appear on the display.

3) Press the STORE/ENT key.
The display will show `--------`

4) Use the number keypad to specify the length of the blank section to be inserted.

Selecting Channels for Insert

5) Use the channel REC keys to select the channels into which you want to insert.

Executing Insert

6) Press the STORE/ENT key or REC key to execute insert.
While insert is in progress, `bUSY` will be shown on the display.
`FInISH` will appear when the insert is complete.

9 Hard Disks

In this chapter, we look at hard disks. Your DR4 should already have an optional internal hard disk installed, so you have everything you need to be able to start recording. If the hard disk has not yet been formatted, see "Formatting New Disks" on page 50.

If you want to increase the available recording time by adding some more storage, read through this chapter to gain a better understanding of how the DR4 works with hard disks. When upgrading, you can keep the internal hard disk and just add an external hard disk via SCSI-A bus. Alternatively, you could replace the internal hard disk with a larger one.

Only certain hard disks can be used with the DR4, so please consult your Akai professional dealer.

Choosing a Hard Disk

There are many types of hard disk currently available, each with slightly different specifications. Your Akai dealer will be able to provide you with information about which hard disks are best for use with the DR4. The following points should also be borne in mind:

- Is the hard disk fitted with two SCSI connectors? This will allow you to add more hard disks simply by connecting to the SCSI-A bus daisy chain.
- Are the SCSI connectors 50-way Amphenol types like the one on the rear panel of the DR4? Some manufacturers use different types of connector for SCSI connections. Although there are connection adaptors available, it's much simpler to standardize with one type.
- Can the SCSI ID number be set? Some of the earlier external disk drives were not fitted with SCSI ID switches. If each hard disk can be set to any SCSI ID, it allows greater flexibility when setting up a SCSI daisy chain.
- Does it have internal or external SCSI termination? Hard disks supplied with an external terminator can be connected at any position in a SCSI daisy chain. Some hard disks that have a fixed internal terminator always have to be connected at the end of the SCSI daisy chain, thus reducing setup flexibility. Especially awkward when you have two hard disks like this.
- Is the access time fast enough? Most currently available hard disks have relatively quick access times. However, some older drives can be quite slow. When the DR4 is playing and recording at the same time, the disk drive is continuously reading and writing data. If the hard disk's average seek time is slower than 19 ms, performance may be affected.
- Is the data transfer rate high enough? This is usually measured in Megabits per second (Mbit/s). A transfer rate slower than 1.5MByte/s (12Mbit/s) may affect the performance of the DR4.

MO Disks

Magneto Optical (MO) disks operate much slower than hard disks, so they cannot be used with the DR4 for recording. However, they can be used to back up your data.

Hard Disk Size

The total available recording time depends on the total size of all storage media. That is, internal hard disk and any external hard disks connected via SCSI-A bus. As can be seen from the table below, the sampling frequency also affects the available time. Basically, with a higher sampling frequency, less time is available. This is because higher sampling frequencies provide a better audio bandwidth, which in turn requires more storage space.

The "1 Channel" column shows how many channel minutes are available with some typical sizes of hard disk. A channel minute indicates the total time available if only one channel is recorded. The "4 Channel" column shows the amount of time that is available to each channel, and is just the "1 Channel" column value divided by four. For example, 100MB at 48 kHz provides 17 channel minutes, that's about 4.2 minutes per channel. However, each channel is not restricted to 4.2 minutes, and can use as much or as little of the available storage media as required until it has all been used. So, for example, one channel may use 8 minutes, another channel 3 minutes, another 5 minutes, and the last channel 1 minute.

Hard Disk Size	Available Minutes:Seconds (Approx.)					
	32 kHz		44.1 kHz		48 kHz	
	4 Channel	1 Channel	4 Channel	1 Channel	4 Channel	1 Channel
2GB	132:50	531:20	96:23	385:33	88:34	354:18
1.2GB	79:42	318:48	57:50	231:20	53:8	212:35
650MB	43:10	172:41	31:19	125:18	28:47	115:8
330MB	21:55	87:40	15:54	63:37	14:36	58:27
240MB	15:56	63:46	11:34	46:16	10:37	42:31
128MB	8:30	34:32	6:10	24:40	5:40	22:40
100MB	6:38	26:34	4:49	19:16	4:25	17:42
88MB	5:50	23:22	4:14	16:57	3:53	15:35
44MB	2:55	11:41	2:07	8:28	1:56	7:47

Theoretically, a maximum of 64GB of hard disk can be connected to the DR4. However, the DR4 cannot record and playback more than 24 hours worth of material (23:59:59:00).

SCSI

The DR4 uses the SCSI connection format for connecting external hard disks. Pronounced "scuzzy", SCSI (Small Computer System Interface) is often used for connecting computer peripherals such as hard disks, scanners, etc. It provides a relatively fast data transfer rate, making it ideal for digital audio applications.

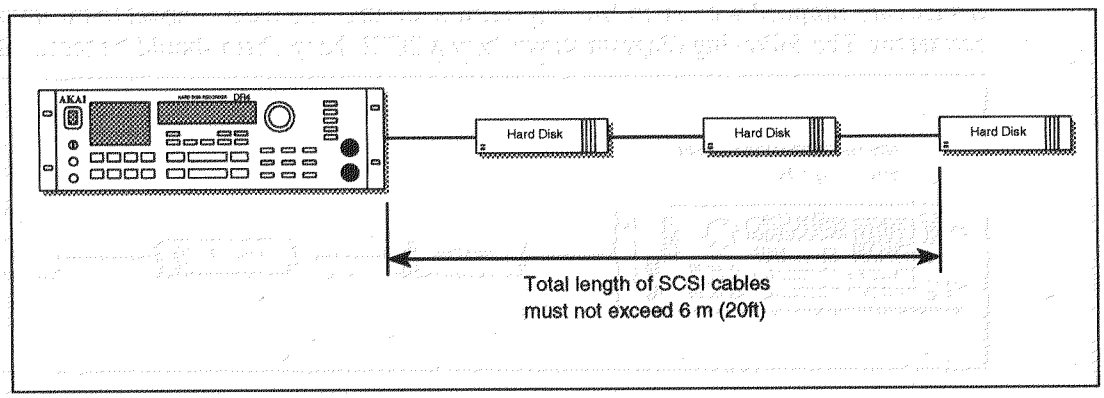
Up to seven devices can be connected in a SCSI daisy chain. One device acts as the controller, and the others as slaves. The controller can communicate with any slave device. Typically, the slave devices communicate with the controller only. In a DR4 system, the DR4 functions as the controller, writing to and reading from the connected slaves.

SCSI-A & SCSI-B

The DR4 has two SCSI buses: SCSI-A and SCSI-B. The SCSI-A bus is used to connect external hard disks for recording. The SCSI-B bus is for backing up to an MO disk and connecting to personal computers. The optional IB-IIIS interface card must be installed to use the SCSI-B bus.

SCSI Cables

Use only quality SCSI cables when connecting SCSI devices. Cables are available in a number of different lengths, however, you should pay particular attention to the total length of the SCSI daisy chain. Note that's its not the length of each cable that's important, but the total length of all cables used in the daisy chain. The total length must not exceed 6 meters (20 ft.).

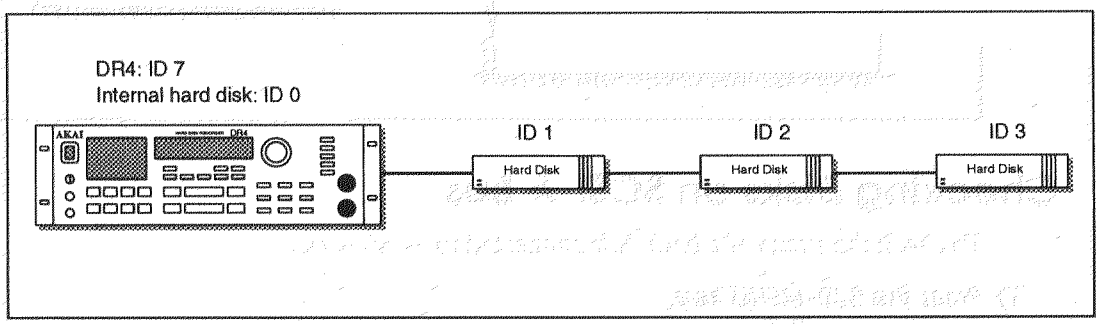


SCSI IDs

Each SCSI device in the SCSI daisy chain is assigned its own ID number. SCSI-A ID numbers can be set from 0 to 7. The DR4 itself uses ID 7, and its internal hard disk ID 0. Use ID numbers other than 0 and 7 for hard disks connected via SCSI-A.

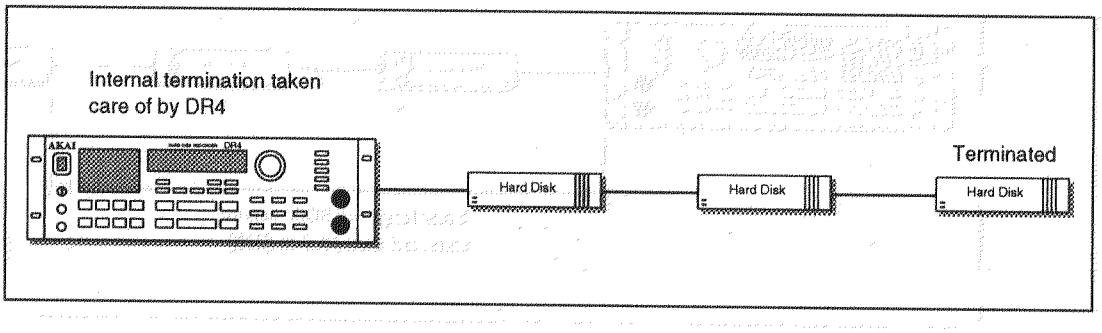
Note: *If you do set an external hard disk's ID number to that used by the internal hard disk, the DR4 will not be able to detect an error, so no error message will appear. In this case, the DR4 may appear to work correctly, but recording will not be performed correctly, and existing material may be damaged. You must take care when setting SCSI ID numbers.*

The following diagram shows how SCSI IDs should be set for a typical DR4 SCSI daisy chain:

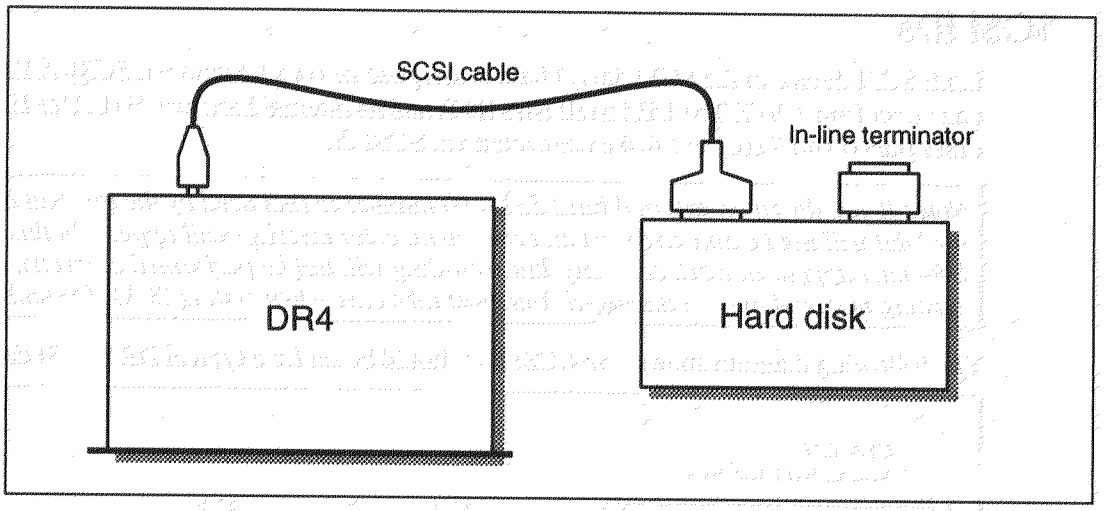


SCSI Termination

The ends of a SCSI daisy chain must be terminated correctly. Otherwise, data errors, system crashes, etc., may occur. Termination at the DR4 end of the chain is taken care of by the DR4. At the other end of the chain you must fit a terminator. Some SCSI devices have a terminator built-in. This type of device must always be connected at the end of the daisy chain. Other devices are supplied with an in-line type terminator that you must connect to the unused SCSI connector. The following diagram shows how a SCSI daisy chain should be terminated:



The following diagram shows an example of an in-line terminator connected to a hard disk:



Checking Disks on SCSI-A Bus

To check the status of a hard disk connected to SCSI-A bus:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the DISK key.**
The SCSI ID of all hard disks that have been formatted and are ready for recording will appear.

A flashing SCSI ID indicates that the DR4 has acknowledged a connected hard disk, but the disk has not yet been formatted.

If you have connected a hard disk, but its SCSI ID does not appear, make sure that all SCSI IDs are set correctly, all SCSI cables are connected correctly, and the hard disk is powered on.

External Hard Disk Operating Precautions

- Before connecting a hard disk, make sure that the DR4 and hard disk are powered off. If a hard disk is connected with its power on it may go out of control.
- Always power on the external hard disks before the DR4. Otherwise, the DR4 will not recognize them.
- When you connect a hard disk that has already been used for recording, i.e., connected to another DR4 or connected then disconnected from the same DR4, format or erase all the material on the disk before recording any new material.
- New unformatted disks can be connected to the DR4 quite safely, and will not be used until formatted. The letter "F" will appear on the display when the DR4 performs a hard disk search. The letter "F" will blink when the DISK sub-menu function is used.
- Do not set an external hard disk's SCSI ID number to that used by the internal hard disk. Operation will be unpredictable and any recorded material may be destroyed. See "SCSI IDs" on page 47.
- Do not power off a hard disk while it is accessing data. The left most dot on the DR4 display indicates that a hard disk is being accessed.
- Do not move or disturb a hard disk while it is powered on, especially when it is accessing data.
- Hard disks should be mounted horizontally or vertically when in use. See the hard disk's operating manual for more details.

Formatting New Disks

New hard disks must be formatted before you can use them for recording. Formatting prepares a disk for storing digital audio data. External disks and the internal hard disk are identified by their SCSI ID. So make sure that you know the SCSI ID of the disk you want to format before starting this procedure.

To format a disk:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the FORMAT key.**
`Id 0` will appear on the display.

3) **Use the jog wheel, shuttle control, or number keypad to select a SCSI ID.**
The selected SCSI ID should correspond with that of the disk that you want to format.

> *Note: If you have a number of disks connected, make sure that you select the correct SCSI ID.*

4) **Press the STORE/ENT key.**
`ErASE` will appear on the display.

5) **Use the jog wheel or shuttle control to select** `For`

6) **Press the STORE/ENT key.**
The message `SUrE ??` will appear on the display.

> ***Important:** If you are reformatting a disk, please note that all existing data will be erased – permanently. Back up any data that you want to keep before reformatting.*

7) **If you are sure, press the STORE/ENT key again to start formatting.**
While formatting is in progress, `For` will flash on the display.

Disk formatting does take time. The larger the disk, the longer it takes.

When disk formatting is complete, `SUCCESS` will appear on the display.

8) **Press the STORE/ENT key.**
The SCSI IDs of connected disks will appear on the display as the DR4 quickly checks them. The formatted disk is now ready for recording.

Erasing Disks

This function allows you erase all material on a disk before starting a new session. You may want to back up the existing material for future use before proceeding. See "Backup" on page 53.

To erase a disk:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the FORMAT key.**
`Id 0` will appear on the display.

3) **Use the jog wheel, shuttle control, or number keypad to select a SCSI ID.**
The selected SCSI ID should correspond with that of the disk that you want to erase.

> *Note: If you have a number of disks connected, make sure that you select the correct SCSI ID.*

4) **Press the STORE/ENT key.**
`ErASE` will appear on the display.

5) **Press the STORE/ENT key.**
The message `SUrE ??` will appear on the display.

> ***Important:** This function erases all material on a disk – permanently. Back up any data that you want to keep before erasing.*

6) **If you are sure, press the STORE/ENT key again to start erasing.**
Disk erasure is relatively quick.

When disk erasure is complete, `SUCCESS` will appear on the display.

7) **Press the STORE/ENT key.**
The SCSI IDs of connected disks will appear on the display as the DR4 quickly checks them. The erased disk is now ready for recording.

Data Alignment

This function should be used when the second dot from the left on the display is lit constantly. This indicates excessive data access activity due to data fragmentation.

What is Data Fragmentation?

When you make a recording onto a newly formatted, or erased disk, data is written to disk in a continuous series of sectors. During playback, the disk drive does not have to work too hard to read the data, because it is in this continuous series of sectors. However, after performing many edits, the data will be spread across many different sectors on the disk, in other words – fragmented. In this case, the disk drive will have to work harder to retrieve all the data necessary for continuous audio playback. If the fragmentation is quite severe, the second dot from the left on the display will be lit constantly. You may also notice some errors during playback.

The alignment function can be used to reorganize the data into a continuous series of sectors.

To align the data:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the ALIGN key.**
AL IGn will appear on the display.

3) **Press the STORE/ENT key.**
The message *SUrE ??* will appear on the display.

4) **If you are sure, press the STORE/ENT key again to align the data.**
Data alignment may take some time.

When data alignment is complete, *SUCCESS* will appear on the display.

5) **Press the STORE/ENT key.**

10 Backup

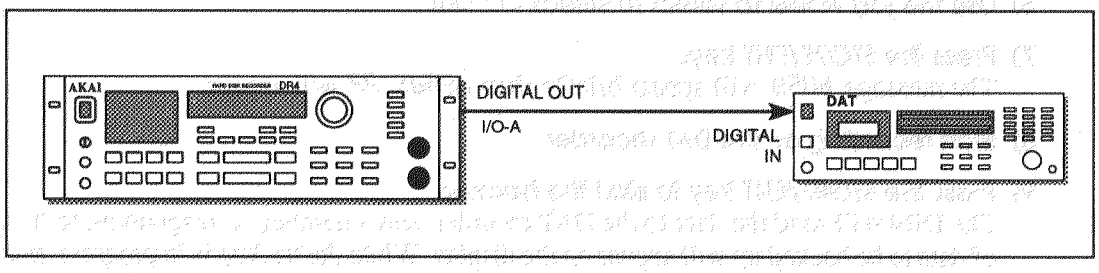
In this chapter, we explain how to back up material recorded on the DR4. You can back up to either a DAT recorder or an external MO disk via SCSI-B.

Backup to DAT

To use a DAT recorder for back up, it must have digital inputs and outputs.

Note: Before backing up to a DAT recorder, make sure that the volume controls on any equipment connected to the DAT recorder's outputs are turned fully down. The sound output by the DAT recorder during backup may damage your loud speakers.

DAT Backup Connection



Backing Up the Entire Disk

The following procedure explains how to back up the entire contents of a hard disk:

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the BACKUP key.**

3) **Use the jog wheel or shuttle control to select** d IG ItAL

4) **Press the STORE/ENT key.**

5) **Use the jog wheel to select to select** ALL

6) **Press the STORE/ENT key.**
The message bUSY will appear briefly, then rEAdY ?? will appear.

7) **Start recording on the DAT recorder.**

8) **Press the STORE/ENT key to start the backup.**
The DR4 will send the data to the DAT recorder, and a number corresponding to the amount of data to be backed up will appear on the display. While the backup is in progress, this number will gradually decrease. Backup is complete when it reaches zero.

Depending on the amount of data, backup does take some time.

Backing Up Certain Material Only

The following procedure explains how to back up just the material between the in point and out point:

1) **Set the in point and out point.**
   See "Specifying the In Point & Out Point" on page 12.

2) **Press the SUB-MENU key.**
   Its indicator will flash.

3) **Press the BACKUP key.**

4) **Use the jog wheel or shuttle control to select** *d IG ItAL*

5) **Press the STORE/ENT key.**

6) **Use the jog wheel to select to select** *in--out*

7) **Press the STORE/ENT key.**
   The message *bUSY* will appear briefly, then *rEAdY PP* will appear.

8) **Start recording on the DAT recorder.**

9) **Press the STORE/ENT key to start the backup.**
   The DR4 will send the data to the DAT recorder, and a number corresponding to the amount of data to be backed up will appear on the display. While the backup is in progress, this number will gradually decrease. Backup is complete when it reaches zero.

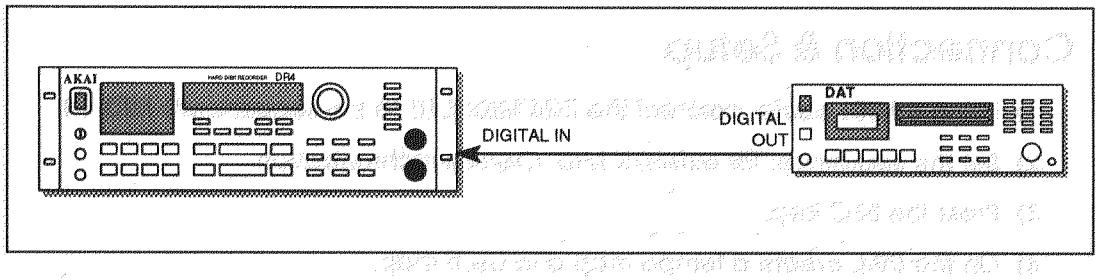
   Depending on the amount of data, backup does take some time.

Loading from DAT

If the data to be loaded overlaps some data that already exists on the hard disk, the existing data has priority, and the data cannot be loaded. In this case, you must erase the existing data first.

> *Note: Before loading from a DAT recorder, make sure that the volume controls on any equipment connected to the DAT recorder's outputs are turned fully down. The sound output by the DAT recorder while loading may damage your loud speakers.*

DAT Loading Connection



1) **Press the SUB-MENU key.**
   Its indicator will flash.

2) **Press the LOAD key.**

3) **Use the jog wheel or shuttle control to select** d IG ItAL

4) **Press the STORE/ENT key.**
   -------- will appear on the display.

5) **Use the number keypad to enter the time at which you want the loaded material to start from.**
   If you enter the wrong time, press the RESET key, then reenter the value.
   If you want the material to start from the same time as it did before it was backed up, do not enter a value. Leave the display as --------

6) **Press the STORE/ENT key.**
   rEAdY ?? will appear on the display.

7) **Rewind the DAT, and start playback.**
   The DR4 will load the incoming data, and a number corresponding to the amount of data to be loaded will appear on the display. While loading is in progress, this number will gradually decrease.
   When loading is complete, SUCCESS will appear on the display.
   If the load failed, an error message will appear.

11 MIDI Synchronization

In this chapter, we explain how to synchronize a MIDI sequencer to the DR4. The DR4 is used as MIDI Clock master, and the MIDI sequencer is used as a MIDI Clock slave. The DR4 cannot be used as a MIDI Clock slave.

IB-113M MIDI Interface Card

To use MIDI synchronization, you must install an optional IB-113M MIDI Interface card. Please contact your Akai professional dealer for details.

Connection & Setup

1) **Using a MIDI cable, connect the DR4 MIDI OUT to the sequencer's MIDI IN.**
2) **Set the sequencer for external MIDI Clock synchronization.**
3) **Press the BBC key.**
4) **On the DR4, create a tempo map and beat map.**
See "Tempo Map & Beat Map" on page 57.
5) **Press the SUB-MENU key.**
6) **Press the SYNC key.**
7) **Use the jog wheel or shuttle control to select MIDI.**
8) **Press the SYNC key to initiate external synchronization.**

Operation

When playback is started and stopped on the DR4, MIDI Start and Stop messages respectively will be sent to the sequencer, and it too will start and stop playback. The sequencer will be synchronized to the MIDI Timing Clock data being output by the DR4. These types of MIDI messages are called System Real-Time messages.

MIDI Sync Notes

The MIDI sequencer is always synchronized according to the time displayed on the DR4. And, the tempo map and beat map always use 0001-01-00 as their initial start point. This applies to both absolute and relative time. Therefore, MIDI synchronization can be offset by using the DR4's relative time function.

MIDI sequencers always treat songs as separate entities, and usually start song playback from the first beat of the first bar. However, the DR4 treats individual songs (recorded on the same disk) as one continuous recording. So subsequent songs do not start at the first beat of the first bar. In this case, you must use relative time and set an offset to make the beginning of subsequent songs coincide with the first beat of the first bar on the sequencer.

If the IB-113M MIDI Interface card has not been installed, and you select MIDI sync, then press the STORE/ENT key, the message noOPt IOn will appear.

Tempo Map & Beat Map

Beat Map

As well as setting the tempo, you must also specify the song's beat (time signature). Just like tempo, if a song's beat remains the same throughout, you only have to specify it once at the beginning of the song. However, if the beat of the song changes, these changes will have to be entered into the beat map.

Initially, the first entry in the beat map is set to 4/4.

Beat map entries are displayed in the following format: 01-04-04 This means that the beat setting is 4/4 starting at entry 01 (initial entry). When the next entry is added to the beat map, it will be displayed as 02-03-04 In this case the beat has been changed to 3/4 at entry 02.

Tempo Map

The MIDI Timing Clock data output by the DR4 will control the tempo of the sequencer. Therefore, you must first create a tempo map on the DR4, so that the sequencer plays at the correct tempo. If a song's tempo remains the same throughout, the tempo map will have only one entry. That entry will be at the beginning of the song and will specify the song's tempo. If the song contains any tempo changes, these changes will have to be entered into the tempo map.

Initially, the first entry in the tempo map is set to 120 bpm.

Tempo map entries are displayed in the following format: 001- 1200 This means that the tempo setting is 120.0 bpm starting at entry 001 (initial setting). When the next entry is added to the tempo map, it will be displayed as 002- 1500 In this case the tempo has been changed to 150.0 at entry 002.

Before creating a tempo or beat map, it's a good idea to jot them down on paper first. This way you'll also have a hard copy for quick reference. The following tables show how you could layout a beat map and tempo map.

Example Beat Map

Entry No.	Beat	Bar No.
01 (initial)	4/4	0
02	3/4	9
03	4/4	17
04		
05		

Example Tempo Map

Entry No.	Tempo	Bar No.
001 (initial)	120	0
002	122	9
003	120	17
004		
005		

Changing the Initial Tempo & Beat settings

If your song does not contain any tempo or beat changes, you only need to change the initial settings.

To Change the Initial Beat Setting:

1) **Press the SUB-MENU key.**
2) **Press the TEMPO key.**
3) **Press the rewind key to select the initial setting.**
   The initial setting is indicated by the 01 at the beginning of the display `01-04-04`
   If the beat has not previously been changed, the initial setting will already be selected.
4) **Use the jog wheel or shuttle control to specify the new beat.**
5) **Press the STORE/ENT key.**
   The new beat setting will be stored.
6) **Press the ESCAPE key to cancel the beat function.**

To Change the Initial Tempo Setting:

1) **Press the TEMPO key.**
2) **Press the rewind key to select the initial setting.**
   The initial setting is indicated by the 001 at the beginning of the display `001- 1200`
   If the tempo has not previously been changed, the initial setting will already be selected.
3) **Use the jog wheel, shuttle control, or number keypad to specify the new tempo.**
   The tempo can be set from 30 to 300 bpm.
   The jog wheel adjusts the tempo in single beat steps, the shuttle control in tenths of a beat.
   While holding down the TEMPO key, you can use the shuttle control to specify the bar and the jog wheel to specify the clock position.
   To specify the tempo using the number keypad, enter the value from left to right. For example, to enter the tempo 123.5, press these number keys in the following order: 1, 2, 3, 5.
4) **Press the STORE/ENT key.**
   The new tempo setting will be stored.
5) **Press the ESCAPE key to cancel the tempo function.**

Creating a Beat Map

Inserting Entries into the Beat Map

1) **Press the SUB-MENU key.**

2) **Press the BEAT key.**
If no entries have yet been made, `01-04-04` will appear on the display.

3) **While holding down the BEAT key, use the jog wheel to specify the bar at which you want to insert an entry.**

4) **When you've specified the bar, release the BEAT key.**
The display will show `---04-04`

5) **Use the jog wheel or shuttle control to specify the beat.**

6) **Press the STORE/ENT key.**
The new entry will be stored in the beat map.

To insert more entries, repeat steps 3 to 6.

Use the rewind and fast forward keys to select entries in the beat map.

7) **When you've finished, press the ESCAPE key to cancel the beat function.**

Checking the Beat Map

To check the current beat:

1) **Press the SUB-MENU key.**

2) **Press the BEAT key.**
The current beat will be displayed.

3) **To find the entry that has specified the current beat, press the rewind key.**

4) **To check the bar at which the entry occurs, press and hold down the BEAT key.**

5) **Use the rewind and fast forward keys to select other entries.**

6) **When you've finished, press the ESCAPE key to cancel the beat function.**

Deleting Entries from the Beat Map

To delete an entry from the beat map:

1) **Press the SUB-MENU key.**

2) **Press the BEAT key.**

3) **Use the rewind and fast forward keys to select the entry that you want to delete.**

4) **Press the REC key.**
The entry will be deleted.

5) **When you've finished, press the ESCAPE key to cancel the beat function.**
The initial entry cannot be deleted.

Creating a Tempo Map

Note: You must create the beat map before creating a tempo map.

Inserting Entries into the Tempo Map

1) **Press the TEMPO key.**
If no entries have yet been made, 001- 1200 will appear on the display.

2) **While holding down the TEMPO key, use the shuttle control to specify the bar and the jog wheel to specify the clock position at which you want to insert an entry.**

3) **When you've specified the bar, release the TEMPO key.**
The display will show ---- 1200

4) **Use the jog wheel or shuttle control to specify the tempo.**

5) **Press the STORE/ENT key.**
The new entry will be stored in the tempo map.
To insert more entries, repeat steps 2 to 5.
Use the rewind and fast forward keys to select entries in the tempo map.

6) **When you've finished, press the ESCAPE key to cancel the tempo function.**

Checking the Tempo Map

To check the current tempo:

1) **Press the TEMPO key.**
The current tempo will be displayed.

2) **To find the entry that has specified the current tempo, press the rewind key.**

3) **To check the bar at which the entry occurs, press and hold down the TEMPO key.**

4) **Use the rewind and fast forward keys to select other entries.**

5) **When you've finished, press the ESCAPE key to cancel the tempo function.**

Deleting Entries from the Tempo Map

To delete an entry from the tempo map:

1) **Press the TEMPO key.**

2) **Use the rewind and fast forward keys to select the entry that you want to delete.**

3) **Press the REC key.**
The entry will be deleted.

4) **When you've finished, press the ESCAPE key to cancel the tempo function.**
The initial entry cannot be deleted.

12 Synchronizing to Other DR4s

In this chapter, we explain how to synchronize two, three, or four DR4s together. Thus providing 8-, 12-, and 16- channel recording respectively. In this case, one DR4 operates as master, and the other DR4s as slaves. It is not possible to transfer data between synchronized DR4s.

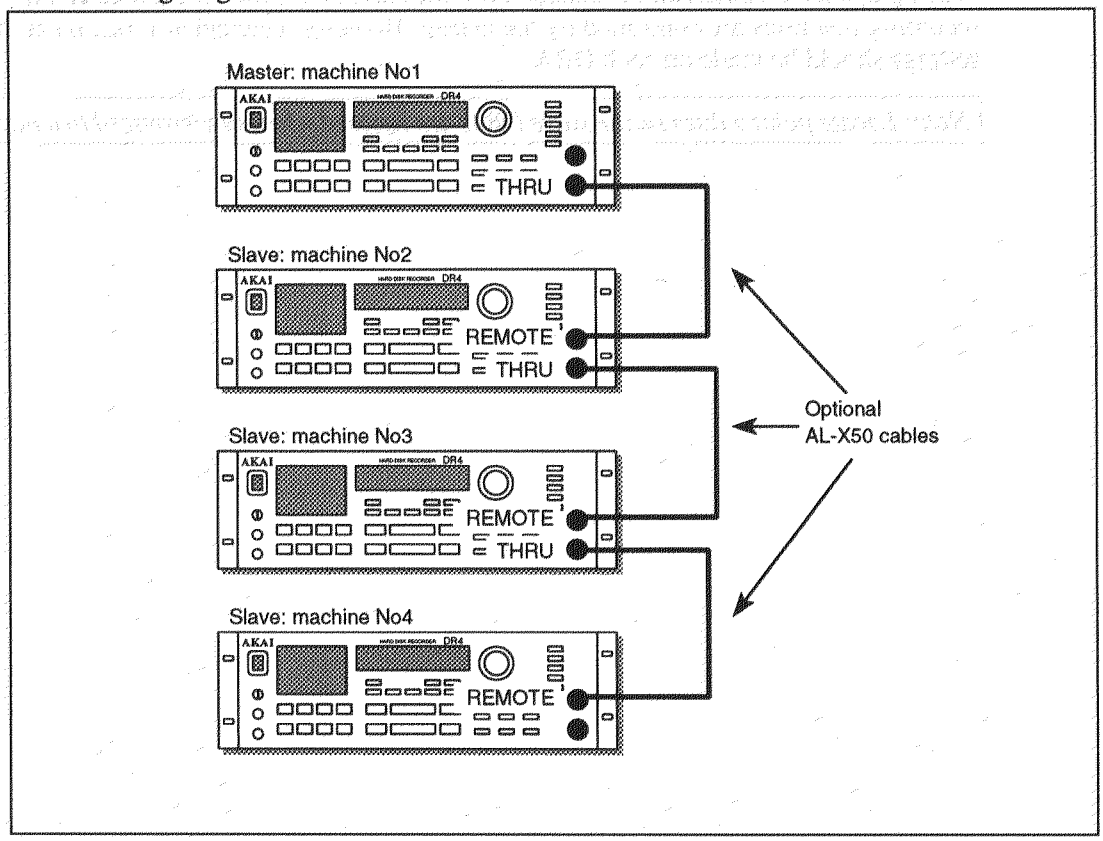
AL-X50 Remote Cable

DR4s are connected together using optional Akai AL-X50 cables. These are available from your Akai professional dealer.

Note: Use only Akai AL-X50 cables for REMOTE and THRU connections.

Connection

The following diagram shows how DR4s should be connected:



Setup

Set up each DR4 using the following procedure:

1) **Press the SUB-MENU key, then the SYNC key.**
2) **Use the jog wheel to select** rEnotE
3) **Press the STORE/ENT key.**
4) **Set the master DR4 to machine ID 1. The first slave to ID 2, the second slave to ID 3, and the fourth slave to ID 4.**

> *Note: Each DR4 must have its own ID number, otherwise, it will not work correctly.*

Operation

1) **Press the SYNC key on each slave DR4 to activate external sync.**
When playback is started on the master DR4, the slave DR4s follow the master. All locate and recording functions are controlled by the master. However, channel arming and auto monitor settings should be made on each DR4.

> *Note: Locate point values on the slave DR4s are ignored when synchronized to a master DR4.*

13 Other Functions

Emphasis

The emphasis function can be used to de-emphasize digital audio recorded on the DR4 before it is output. The DR4 cannot emphasize incoming signals.

If you are using analog inputs and outputs only, you do not have to worry about emphasis, because all digital devices de-emphasize their digital audio before outputting it via their analog outputs. The only situation where it should be considered is, when you record an emphasized digital signal to the DR4 via its digital inputs. In this case, the emphasis function should be turned on, so that the audio is de-emphasized before being output. If it is not, you will notice a slight frequency boost above 3.5 kHz.

Emphasis can be switched on and off independently for channels 1/2 and 3/4.

Turning on Emphasis

1) **Press the SUB-MENU key.**
Its indicator will flash.

2) **Press the EMPHA key.**
Its indicator will light up, and the current emphasis setting will appear on the display.

3) **Use the jog wheel or shuttle control to select an option.**
The following table shows the four options:

Option	Meaning
12oF 34oF	1/2 off, 3/4 off
12on 34oF	1/2 on, 3/4 off
12oF 34on	1/2 off, 3/4 on
12on 34on	1/2 on, 3/4 on

4) **Press the STORE/ENT key.**
The new emphasis setting will be entered.

What is Emphasis?

Emphasis is a technique that was used to improve the performance of the first generation of A/D and D/A converters: a bit like noise reduction for digital systems. Converters have improved considerably over the past few years, so emphasis is no longer used. It has been included on the DR4 for situations where emphasized digital audio from old digital master tapes, CDs, etc., is being recorded.

> ***Note:*** *If a channel contains both emphasized and unemphasized data, it cannot be played correctly.*

SCMS

Pronounced "scums", SCMS (Serial Copy Management System) is a protection system designed to stop multiple digital copying of copyrighted material. SCMS applies to all CD players and consumer type DAT, MD, and DCC recorders. Basically, it prevents second-generation digital copies being made. It has no effect when analog connections are used.

When the DR4 receives a digital signal that contains SCMS, it will not prevent the DR4 from recording. The digital signal will be recorded without the SCMS.

Note: *If you are recording some copyright material from a CD, DAT, MD, DCC, etc., you must have approval before you use it. It is alright to use copyright free material. Akai cannot accept any responsibility for breach of copyright law.*

Appendix

Initial Settings

The following table shows how various **functions** are set when the DR4 is powered on, or a hard disk is formatted.

Function	Setting
Status	Stop
REC keys	All off
Rehearsal	Off
Sync	Off
Varipitch	Off
ABS/REL	ABS
Auto monitor	Off
Input select 1/2	Analog
Input select 3/4	Analog
Preroll	Off
Repeat	Off
Auto punch	Off
Last memory	00:00:00:00

The following table shows how various **parameters** are set when a hard disk is formatted. These settings are remembered when the DR4 is powered off.

Parameter		Setting
Relative time reference		00:00:00:00
Sub menu parameters	Preroll time	3 seconds
	Play to out time	3 seconds
	Sampling frequency	44.1 kHz
	Sync	Remote
	Emphasis	All channels off
	Time display	30 frame
	Varipitch amount	–53
	Digital input	RCA
	Digital output	TYPE II
	Beat	Only 4/4 at 001.01.00
	Backup	digital
	Load	digital
Tempo map		Only 120.0 at 001.01.00
Direct locate points		All 00:00:00:00
Stack memories		All 00:00:00:00
In point		00:00:00:00
Out point		00:00:00:00

Troubleshooting

If your DR4 does not seem to operating as it should, see if the symptoms are listed below:

Symptom	What To Do
The DR4 cannot be powered on.	Make sure that the power cable is connected to a suitable AC receptacle.
	Make sure that the DR4's POWER switch is in the ON position.
	If the DR4 still cannot be powered up, contact your Akai professional dealer.

Display Messages

Messages	Summary	What to Do
no dI G IA	No digital signal is present at digital input A/B.	Is the digital signal being output by the sending device correctly?
no dI G Ib		Is the sub-menu D IN function set correctly?
noOPt IOn	Optional card is not installed.	Install option card.
FSOOPS	The digital signal being input is at a different sampling frequency to that set on the DR4.	Check the sampling frequency setting in the FS sub-menu function.
		Check the sampling frequency of the device sending the digital signal.
bUSY	Indicates that the DR4 is busy.	Some editing functions do take a little time.
PLL UnLC	Phase locked loop unlocked: the DR4 cannot synchronize to an external digital signal or SMPTE timecode due to that signal being out of the DR4's sync range.	Make sure that the external signal is within the DR4's sync range.
CAUtI on	The hard disk access time may not be adequate. Also, recording may not be carried out correctly.	Align the hard disk. See "Data Alignment" on page 52. If the problem remains, the hard disk access time may not be adequate.
OuEr	The hard disk cannot access the data fast enough.	The hard disk access time may not be adequate.
ooPS 50	Repeat interval too short.	Specified interval is too short. See "Specifying the In Point & Out Point" on page 12.
ooPS 51	Playback interval too short.	
ooPS 52	Record interval too short.	
ooPS 53	Edit interval too short.	
ooPS 54	Stop due to PLL unlock.	The DR4 cannot synchronize to an external digital signal or SMPTE timecode due to that signal being out of the DR4's sync range.
ooPS 55	Insufficient disk space to perform edit.	Free up some disk space by erasing some unnecessary material.
ooPS 56	The result of this edit would produce data that exceeds the DR4's 24 hour limit.	The DR4 cannot work with data that exceeds 24 hours.
ooPS 57	Audio management table is full.	Align the hard disk. See "Data Alignment" on page 52.
ooPS 58	There is no data to backup.	
ooPS 59	Insufficient disk space to perform load.	Erase some unnecessary material. Or, add some extra hard disk space.
ooPS 61	The data that you are trying to load overlaps the data already on the hard disk.	Erase the existing data.

Error Messages

There are three types of error message: E00. E00-00. E00-0000

If an error message similar to one of the above appears, note the code number, and check the following remedies. If that does not correct the problem, or the error message appears frequently, please contact your Akai professional dealer.

1 ~ 13	Hard disk read/write error	Press the ESCAPE key to clear the error message, and back up all the data. Then, reformat the hard disk, and reload you data.
14, 15	Hard disk added or replaced	Erase the hard disk.

Specifications

Digital Audio Format		16-bit linear PCM
Number of Channels		4 channels (expandable to 16 using four DR4s)
A/D Conversion		16-bit 64-times oversampling 5th ΔΣ modulation
D/A Conversion		Advanced 1 bit, 18-bit 8-times oversampling
Sampling Rates		32 kHz
		44.1 kHz
		48 kHz
Audio Frequency Response		30 ~ 22 kHz ±1.0 dB (fs @ 48 kHz)
Dynamic Range		Greater than 90 dB
Distortion		Less than 0.05% (1 kHz, full scale –15 dB)
Channel Crosstalk		Greater than 80 dB (1 kHz, fs @ 48 kHz)
Wow & Flutter		Immeasurable
Recording Media		Optional Internal hard disk or external hard disk
Recording Time With optional 240MB hard disk	**fs @ 48 kHz**	4 ch = 10 min, 37 sec. 1 ch = 42 min, 31 sec
	fs @ 44.1 kHz	4 ch = 11 min, 33 sec. 1 ch = 46 min, 16 sec
	fs @ 32 kHz	4 ch = 15 min, 56 sec. 1 ch = 63 min, 46 sec
Timecode Frame Rates		24, 25, 29.97, 30, 30D
Display		Eight 7-segment LEDs
Peak Level Meter		Four 20-segment LED bars
Locator		8 direct locate points
		100 stack locate points
Analog Inputs x4	**Nominal**	+4 dB/–10 dB (balance/unbalance)
	Max. Input	+19 dB/+5 dB (balance/unbalance)
	Impedance	94 kΩ /47 kΩ (balance/unbalance)
	Connector	6.3 Ømm stereo phone jack
Analog Outputs x4	**Nominal**	+4 dB/–10 dB (balance/unbalance)
	Max. Input	+19 dB/+5 dB (balance/unbalance)
	Impedance	200Ω/100Ω (balance/unbalance)
	Connector	6.3 Ømm stereo phone jack
Digital I/O-A (EIAJ CP-1201)	**IN**	1 x XLR-3-31
		1 x RCA/phono
	OUT	1 x XLR-3-32
		1 x RCA/phono
SCSI–A (for external hard disk)		1 x 50 pin Amphenol
PHONES x1		6.3 Ømm stereo phone jack
FOOT SW x1		6.3 Ømm phone jack
REMOTE & THRU		8-pin DIN (for connection to other DR4s)
Extension Slots x4		SCSI-B (IN/THRU), SMPTE, MIDI, Digital I/O-B
Supplied Accessories		Power cable
		Owner's Manual
Power Requirements	**U.S.A. & Canada**	120 V AC, 60 Hz
	Europe (not U.K.)	220 – 230 V AC, 50 Hz
	U.K. & Australia	240 V AC, 50 Hz
Power Consumption		48 W (U.S.A. & Canadian model)
Operating Temperature		5˚C ~ 40˚C (40˚F ~ 105˚F)
Operating Humidity		30% ~ 80% (no condensation)
Dimensions (W x H x D)		483 x 132.6 x 410 (425 overall) mm (19 x 5.2 x 16.1 inch) EIA 3U
Weight		9.5 kg (21 lb)
Options		DL4 Remote Controller
		HD240 240MB hard disk
		IB-11OD Digital I/O-B (digital I/O for channels 3 & 4)
		IB-112T SMPTE/EBU Reader
		IB-113M MIDI Interface
		IB-IIIS SCSI-B interface
		AL-X50 DR4 remote connection cable

0 dB referenced to 0.775 V

Specifications subject to change without prior notice.

MIDI Implementation Chart

Date: 6/5/93
Version: 1.00

Function		Transmitted	Recognized	Remarks
Basic Channel	Default			
	Changed			
Mode	Default			
	Messages			
	Altered	**********		
Note Number:	True Voice	**********		
Velocity	Note On			
	Note Off			
After touch	Keys			
	Chs			
Pitch bend				
Control Change				
Program Change	True#	**********		
System Exclusive				
System Common	Song position	O		(*1)
	Song Select	X		
	Tune	X		
System Real Time	Clock	O		(*1)
	Command	Continue 0, Stop 0		
Aux Messages	Local On/Off			
	All Notes Off			
	Active Sense			
	Reset			
Notes				

Mode 1:OMNI ON, POLY
Mode 2:OMNI ON, MONO
O: Yes
Mode 3:OMNI OFF, POLY
Mode 4:OMNI OFF, MONO
X: No

(*1) Applies to optional IB-113M MIDI Interface